# Chemical Industries

NOVEMBER 1950


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Sheeted rubber rolls on after leaving mill

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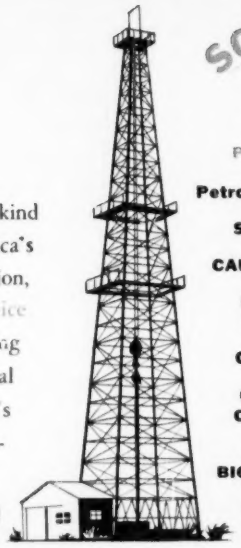

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# BOOKS FOR INDUSTRY

**Unit Operations,** by G. G. Brown and eleven co-authors. John Wiley & Sons, Inc., New York 16, N. Y.; XII + 611 pp.; $7.50.

THIS LATEST text on unit operations has been divided into four sections. The first and shortest discusses those unit operations which are concerned with the handling of solid materials, such as screening, size reduction, and solids handling. Part 2 is devoted to those unit operations involving liquids, or liquids and solids in contact. Part 3 discusses separation by mass transfer, such as solid-liquid extraction, liquid-liquid extraction, vapor-liquid transfer operations and absorption. Part 4 is devoted to energy and mass transfer rates. Discussed here are heat transfer, evaporation, crystallization, agitation, and drying.

The arrangement of the subject matter is in order of increasingly difficult student comprehension rather than in order of assumed importance of the unit operation in question. The treatment of mass transfer in Part 4 is so rigorous that it is suitable as text material for post-graduate work.

**Chemical Engineers' Handbook,** by John H. Perry. McGraw-Hill Book Co., New York 18, N. Y.; XV + 1942 pp.; $15.

GREAT CHANGES have been made in this chemical engineers' bible. As in the past revision, the new third edition has been fully revised and expanded to present the most authoritative and up-to-date information on the theory and practice of chemical engineering. The book is now divided into thirty sections rather than twenty-nine as in the past, and the format has changed from the previous 5" x 7"-page size to a two-column arrangement on 7" x 10" pages, greatly contributing to easy use.

One hundred and forty-one contributors provide complete and expert coverage of all types of unit operations and the equipment and tools necessary if these operations are to be carried out. The topics covered range from mathematical tables to flow of liquids; gas absorption to process control. It is truly a must on the bookshelf of all chemical engineers.

**Organic Syntheses,** Volume 30, edited by A. C. Cope and board. John Wiley & Sons, Inc., New York 16, N. Y.; vi + 115 pp.; $2.50.

THE LATEST addition to the procedures of organic synthesis, covering 39 preparations new to the series.

**Physico-Chemical Constants of Pure Organic Compounds,** by J. Timmerman. Elsevier Publishing Co., Inc., New York; viii + 693 pp., $12.50.

THIS BOOK is the result of 25 years' activity of the International Bureau of Physico-Chemical Standards, Brussels, of which the author is director, together with a systematic study of the whole of the chemical literature up to January of this year. The main part of the book is formed by tables recording, as completely as possible, those physico-chemical constants of organic compounds which have been measured with sufficient care to warrant their acceptance as data established with a precision worthy of contemporary science. This book, then, is not merely a collection of published data, but is the result of critical evaluation. Original references are given and compounds are indexed by formula and name.

**Industrial Chemicals,** by W. L. Faith, Donald B. Keyes, and Ronald L. Clark. John Wiley & Sons, Inc., New York 16, N. Y.; XI + 652 pp.; $8.

THE AUTHORS have presented data on the various commercial processes for producing 106 industrial chemicals, including nearly all chemicals of any major industrial importance.

Each chemical is discussed in a separate section and in each section the information is supplied in the following order: current manufacturing processes; equations for the reactions involved; raw material requirement, and, in some cases, utility and labor requirements; production and price charge covering the past twenty years; generalized use pattern; miscellaneous data; economic aspects; a graph noting the location of the manufacturing facilities in the United States. It will be of the greatest interest to those who may find it necessary to compare the various production processes for industrial chemicals.

**The Friction and Lubrication of Solids,** by F. P. Bowden and D. Tabor. Oxford University Press, New York 11, N. Y.; xii + 337 pp.; $7.00.

A MONOGRAPH covering the conclusions of an experimental study of the physical and chemical processes that occur in the friction of solids. Not a general text, it deals almost entirely with experimental research into the mechanism of friction and boundary lubrication.

**Chemical Thermodynamics,** by Frederick D. Rossini. John Wiley & Sons, Inc., New York 16, N. Y.; xi + 514 pp.; $6.00.

A COMPLETE treatment of the subject by a well qualified author, the book progresses from the fundamental laws of thermodynamics to their application in practical chemical and physical systems. Divided into three categories of subject material, the topics are treated in logical order rather than in the chronological sequence of the discovery or development. The first several chapters are devoted to background matter such as the temperature scale and fundamental constants. A thorough discussion of modern chemical thermodynamics occupies the body of the volume with special applications, calculations and sources of thermodynamic data bringing up the rear.

Liberal use of schematic diagrams to illustrate difficult conceptions go a long way in making this book a thoroughly comprehensive approach to a vital subject.

**German-English Dictionary for Chemists** (3rd Ed.), by Austin M. Patterson. John Wiley & Sons, Inc., New York; xviii+541 pp., $5.

THE THIRD edition of this well-known dictionary has grown from 42,000 entries to about 59,000. The major additions are in the fields of chemical technology, electronics, and warfare. Additional meanings are given for many terms that were listed in the earlier editions.

The handy size and durable manufacture of this book is in keeping with its continual usefulness to those chemists who have to work with the German literature.

**Indium,** by Maria Thompson Ludwick. Indium Corp. of America, New York, N. Y.; 276 pp.; $7.50.

A COMPREHENSIVE reference volume designed to give the whole story of indium; its sources, chemistry, metallurgy, electrical properties and possible useful applications of the metal. The discovery, occurrence, extraction, electrochemistry, analysis, alloys, phase diagrams, photomicrographs and various miscellaneous information is discussed and presented for study. These topics are not treated in any detail, but in a general way intended to give the reader a survey of the entire situation.

A systematic collection of material from the literature with abstracts of articles and patent information is included in an annotated bibliography. The author has also covered the history of The Indium Corp. of America, since this company played a major part in the development of the metal as an industrial material.

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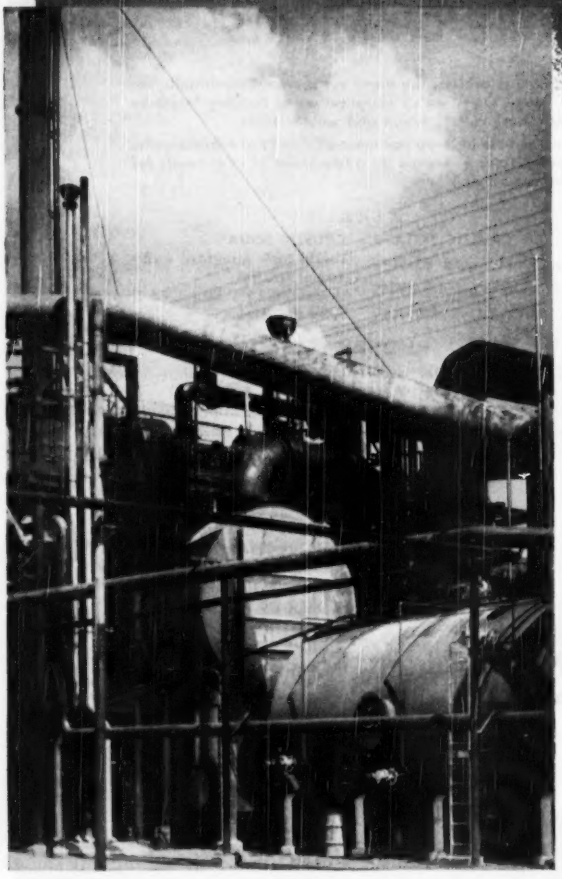

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# Chemical Industries

Including CHEMICAL SPECIALTIES

Vol. 67, No. 5

NOVEMBER 1950

**The Business Magazine of the Chemical Process Industries**


*What's new*


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# THE READER WRITES

### *The Missing Line*

*To the Editor of Chemical Industries:*

I appreciated reading your September issue and, in particular, the "Back to Nature" story. I should be glad, however, if you could send me the rest of the quotation which was interrupted at the bottom of the third column on page 383.

W. L. FAITH,
Corn Products Refining Co.,
Argo, Ill.

*Reader Faith spotted an error which carried through the first issues of CI off the press, was later caught by an eagle-eyed printer. For those subscribers who received those uncorrected early copies this is the entire quotation: "When we bear in mind that the baking and cereal industries consume 1,350,000,000 pounds of lard and shortening annually, we see the terrific potentialities of these new chemicals." —Ed.*

### *Just Like 1940?*

*To the Editor of Chemical Industries:*

Some of the "Has-Beens" among the alumni of the Chemical Bureau of W.P.B. may soon find themselves "Here-Agains." So writes one highly regarded and colorful observer of the Washington scene. Here's her letter:

"I paid a recent visit to the National Production Authority (1950 version of WPB) and if you think things aren't just like 1940, here's the tip—they are using War Production Board envelopes. Honest! To find anyone at NPA you just call Sterling 9200, ext. 4411 and that gets you the NPA receptionist. From there on, you're on your own. They are in the Commerce Building and Tempo T, at 14th and Constitution Ave.

"H. B. McCoy is heading up the Office of Industry Operations (in which is Chemicals), transferred from the Bureau of Foreign and Domestic Commerce. Chemicals is presently headed by our old friend C. C. Concannon, who hasn't changed a bit.

"NPA has had several meetings composed of scattered representatives of various industries, all very hush-hush. Apparently they are going to play "Don't let your left hand know what your right hand is doing" at least for a while. I do know that the military preference rating orders are being handed out, so get in line, boys. And step right over here to NSRB for certificates of necessity. And right around the corner and two doors down for V-Loans. It all sounds depressingly familiar.

"See you around Washington, and happy controls."

(Name withheld, but perhaps you've guessed it already)

### *Photo Switch*

Bing Humphrey has a moustache; John Wilkinson smokes a pipe. CI's editors know it. But last month's readers were misled, for the captions under the pictures of these two "Yankee Enterprisers" (*CI, Oct. 1950, p. 556-557*) were unfortunately transposed. Here's who should have been who in "What's New":

J. W. WILKINSON

B. J. HUMPHREY

### *A Closer Eye on Markets*

*To the Editor of Chemical Industries:*

May we extend our most hearty congratulations on the first issue of Chemical Industries under its new management.

May we, however, make one suggestion that we think might improve the value of some of the departments in this magazine. We have a special reference here to the Market Review which appears on page 494 of the September issue. This suggestion would be that some method be used to indicate the date on which this review is written.

LOREN B. GRIMSLEY
The Simoniz Company,

*Currently, Market Review is one of the last departments in CI to be "closed." Next year the time between writing and publication will be reduced even more because effective January 20th, CI will be published weekly.—Ed.*

### *Facts Versus Emotions*

*To the Editor of Chemical Industries:*

The Atlas Powder Company wants to thank you for what we think is a very clear presentation of the problems involved in the Finding of Fact which threatens to become the new bread standard. While we cannot find a single fact wrong in this article, we realize that it took great courage for your organization to bring them out and we congratulate you on your stand.

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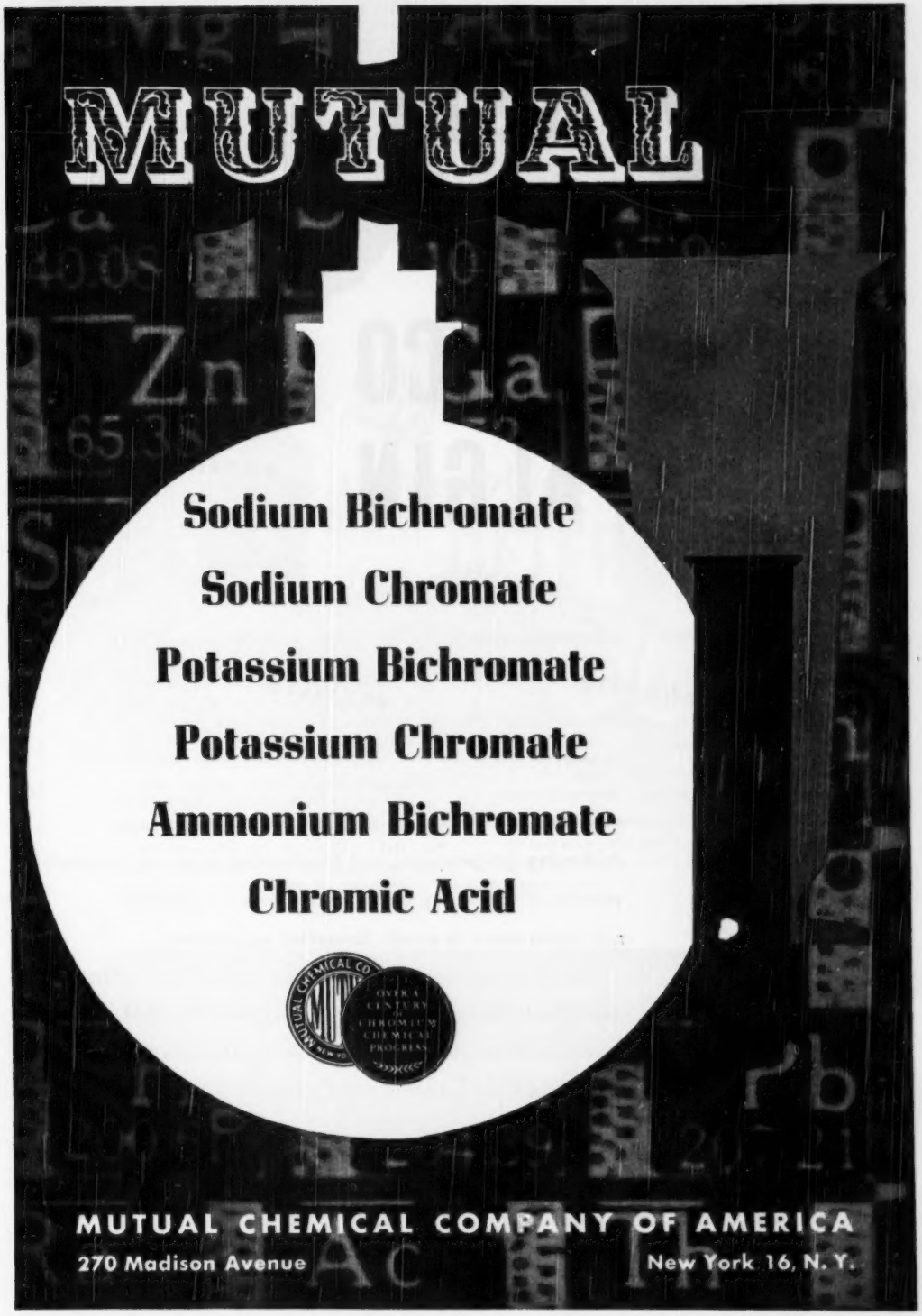
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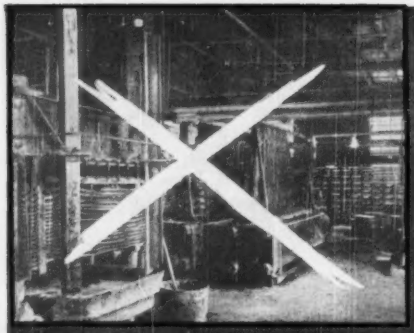

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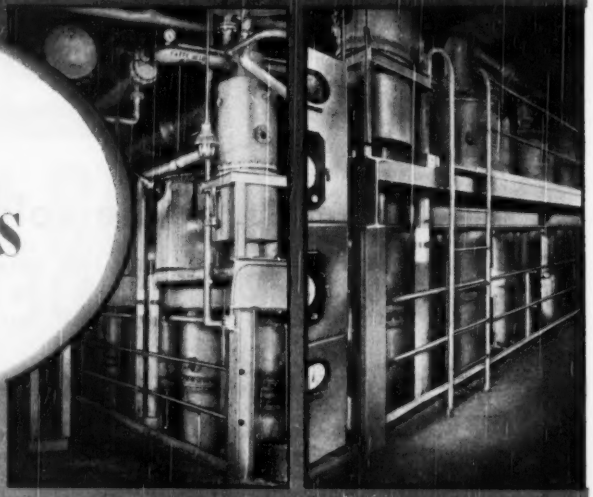

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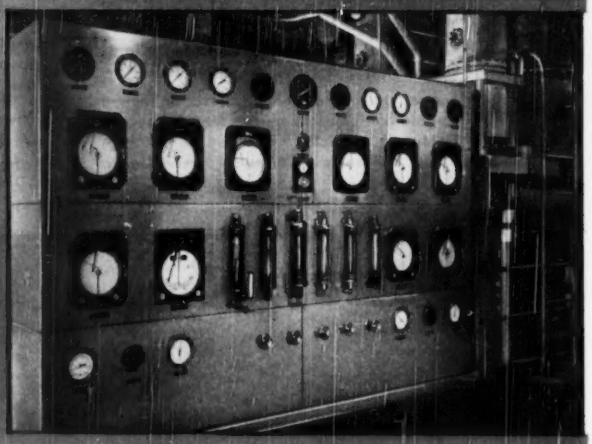

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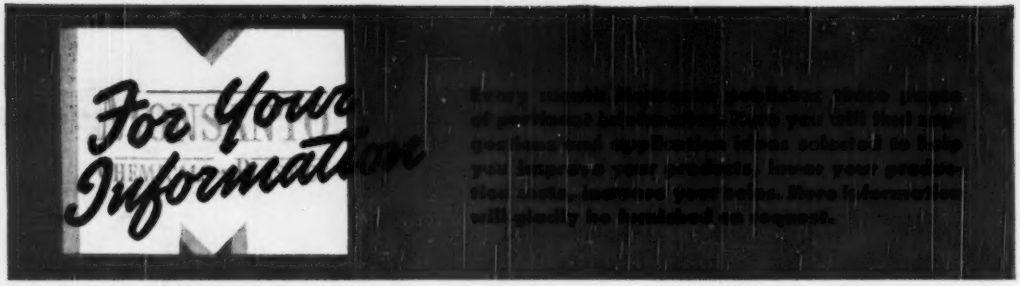


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**Suggested Use:** To confer high "green strength" and good high-temperature bonding to heavy-duty refractures and other ceramics; to substitute for sodium silicates, particularly where the alkalinity of silicates is undesirable.

**Properties:** A glassy, thermoplastic, colloidal aluminum phosphate milled with ceramic-grade clay as a parting agent. It is a free-flowing tan powder having a packed density of 0.9. Typical analysis: $P_2O_5$, 37.2%; $Al_2O_3$, 22.2%; $SiO_2$, 10%; ignition loss, 30%; particle size, essentially all through 100 mesh.

**Availability:** Commercial quantities. (P-1)

### 2-Bromothiophene (alpha-Bromothiophene)

$C_4H_3SBr$ M. W. 163.0

**Suggested Use:** Intermediate in chemical synthesis.

**Properties:** Colorless, oily liquid. Slowly darkens on standing. Miscible in alcohol, ether and other organic solvents. Immiscible in water. B.P. about 150° C.; Sp. Gr. 1.706 at 25°/25° C.; Refr. Ind. 1.584 at 25° C.

**Availability:** Pilot plant quantities. (O-2)

### 4-Chloro-2-Methylphenoxyacetic Acid

$CH_3ClC_6H_3OCH_2COOH$ M. W. 200.3

**Suggested Use:** Selective herbicide.

**Properties:** A technical product. Tan powder. Soluble in alcohol, benzene and acetone; sparingly soluble in water.

**Availability:** Pilot plant quantities. (O-3)

### Diisobutenyl Succinic Anhydride

$C_4H_9CHC(O)OC(O)CH_2$ M. W. 210.3

**Suggested Use:** Intermediate in alkyd resins, surface-active agents, plasticizers and other fields.

**Properties:** A colorless to pale-yellow viscous liquid. Soluble in acetone and benzene, reacts with alcohol to form esters, insoluble in water and decomposes slowly to the acid. B.P. about 120-130° C. at 1 mm.; Sp. Gr. 1.04 at 25°/25° C.

**Availability:** Pilot plant quantities. (O-4)

### 2-(2-Dimethylaminoethylamino)-pyridine

$(CH_3)_2NCH_2CH_2NHC_5H_4N$ M. W. 165.2

**Suggested Use:** In the preparation of antihistaminics and other pharmaceuticals.

**Properties:** Yellow to brown, clear liquid. Miscible with water, alcohol, and benzene. B.P. about 265° C.; Sp. Gr. 0.99 at 25°/25° C.

**Availability:** Commercial quantities. (O-5)

### Dimethyl Fumarate

$CH_3OOCCHCHCOOCH_3$ M. W. 144.1

**Suggested Use:** Copolymer in polyester resins.

**Properties:** White powder. Soluble in alcohol, insoluble in water. M.P. 102° C. B.P. 192° C.

**Availability:** Semicommercial quantities. (O-6)

### Dimethyl p-Nitrophenyl Thionophosphate

$(CH_3O)_2P(S)OC_6H_4NO_2$ M. W. 263.2

**Suggested Use:** For the preparation of insecticidal and miticidal sprays and dusts.

**Properties:** Light-amber crystalline compound. Miscible with alcohol, acetone and benzene; immiscible with water. Cr. Pt. 25° to 30° C. Refr. Ind. 1.55 at 40° C. Sp. Gr. 1.39 at 25°/25° C.

**Availability:** Pilot plant quantities. (O-7)

### 2,4-Dinitrophenyl Thiocyanate

$(NO_2)_2C_6H_3SCN$ M. W. 225.1

**Suggested Uses:** Plant fungicide; short-stop in polymerization of synthetic rubber and intermediate.

**Properties:** Golden-yellow crystalline powder. Slightly soluble in alcohol, soluble in benzene and acetone, insoluble in water. M. P. about 135° to 140° C.

**Availability:** Semicommercial quantities. (O-8)

### o-Ethylaniline (o-aminoethylbenzene)

$CH_3CH_2C_6H_4NH_2$ M. W. 121.2

**Suggested Use:** Chemical intermediate in dyestuff, rubber and other fields.

**Properties:** Yellow liquid. Like aniline, it turns red on long standing. Miscible in alcohol and benzene, slightly miscible in water. B. P. about 215° C. Refr. Ind. 1.56 at 25° C. Sp. Gr. 0.980 at 25°/25° C.

**Availability:** Semicommercial quantities. (O-9)

### o-Ethylnitrobenzene

$C_2H_5C_6H_4NO_2$ M. W. 151.1

**Suggested Use:** Intermediate in dyestuff, pharmaceuticals and other fields.

**Properties:** Yellow to green clear liquid. Miscible in most organic solvents, immiscible in water. Cr. Pt. about −12° to −14° C. Sp. Gr. 1.1 at 25°/25° C. Refr. Ind. 1.53 at 25° C. B.P. about 228° C.

**Availability:** Commercial quantities. (O-10)

### Fluid F-9 (Nonflammable Hydraulic Fluid)

**Suggested Use:** In industrial hydraulic applications where low cost, nonflammability and high lubricity are desired.

**Properties:** Clear, light-yellow liquid. Sp. Gr. 1.27 at 25°/25° C. Pour point about 5° F. V.I. above 15. Viscosity at 210° F., 5.5 to 6.0 centistokes. Autogeneous ignition point above 1100° F.

**Availability:** Commercial quantities. (O-11)

### p-Formylacetanilide

$CH_3C(O)NHC_6H_4CHO$ M. W. 163.2

**Suggested Use:** Intermediate in pharmaceutical and other fields.

**Properties:** Light-yellow crystalline powder. Soluble in water (10% at boiling), soluble in alcohol and acetone. M.P. about 155° C.

**Availability:** Semicommercial quantities. (O-12)

### p-Formylacetanilide Thiosemicarbazone

$CH_3C(O)NHC_6H_4CHNNHC(S)NH_2$ M. W. 236.3

**Suggested Use:** In antitubercular therapy.

**Properties:** White to yellow-white crystalline powder. Slightly soluble in alcohol and acetone, very slightly soluble in water. M.P., decomposes about 225° C.

**Availability:** Commercial quantities. (O-13)

### Hydraulic Fluid OS-16 (Flame-resistant Hydraulic Fluid)

**Suggested Use:** As an industrial hydraulic fluid in critical applications where lack of toxicity and nonflammability are required over a wide range of operating temperatures.

**Properties:** Clear, light-blue, mobile liquid. Sp. Gr. 1.09 at 25° C. Viscosity 11.05 centistokes at 100° F. and 2.65 at 210° F. Viscosity index 76. Pour point −70° F.

**Availability:** Commercial quantities. (O-14)

### Methyl p-Toluenesulfonate

$CH_3C_6H_4SO_2CH_3$ M. W. 186.2

**Suggested Use:** As a selective methylating agent.

**Properties:** White to light-yellow liquid or crystals. Soluble in alcohol and benzene, insoluble in water. Sp. Gr. 1.23 at 25°/25° C. Cr. Pt. 26° to 27° C.

**Availability:** Commercial quantities. (O-15)

### p, p′ Diisocyanatodiphenylmethane

p,p′-$OCN{-}C_6H_4{-}CH_2{-}C_6H_4{-}NCO$ M. W. 250

**Suggested Uses:** As a cross-linking agent for polymers; as an ingredient for foamed resins and in adhesives, and in the preparation of copolymers.

**Properties:** Pale-yellow solid. Insoluble in water, soluble in benzene. Freezing point about 37° C. Boiling point 194-199° C., (5 mm.). Sp. Gr. 1.185 at 50° C.

**Availability:** Semicommercial quantities. (P-16)

### Phenyl 2-Thienyl Ketone (Benzoylthiophene)

$C_6H_5COC_4H_3S$ M. W. 188.1

**Suggested Use:** As a chemical intermediate particularly in pharmaceuticals.

**Properties:** Yellow or green lumps. Soluble in alcohol, acetone and benzene; insoluble in water. Cr. Pt. 52° C.

**Availability:** Commercial quantities. (O-17)

### Phosphorous Acid 70%

$H_3PO_3$ M. W. 82.04

**Suggested Uses:** As a strong, though sometimes slow, reducing agent; as an intermediate in the manufacture of phosphite salts. (Disodium phosphite, monosodium phosphite; sodium hemaphosphite.)

**Properties:** A white crystalline solid. M.P., 73° C. Furnished as a water-white 70% clear solution of phosphorous acid in water. Sp. Gr., 1.420 at 25° C. Thermal change in Sp. Gr., 0.00074 per degree C. from 10 to 60° C. Electrical conductivity, approx. 0.15 reciprocal ohms at 25° C. B.P. of 70% solution, 125° C. at 760 mm. Solution loses water up to approx. 235° C., and decomposes at that temperature to $PH_3$ and $H_3PO_4$. Solution becomes saturated at −20° C., and freezes solid at approx. —50° C. Ref. Ind. of supercooled 100% $H_3PO_3$, 1.4420 at 30° C. Phosphorous Acid is a strong dibasic acid. Ionization constants at concentration of 0.05 mols./1. at 18° C. are $K_1 = 5.4 \times 10^{-3}$, $K_2 = 2.1 \times 10^{-7}$.

**Availability:** Commercial quantities. (P-18)

### RZ-30

$(C_4H_9)_2NC(S)SNH(C_6H_{11})(CH_3)$ M. W. 332

**Suggested Use:** As an ultra-accelerator for vulcanizing rubber cements.

**Properties:** 50% solution of N,N-dimethyl cyclohexyl ammonium dibutyl dithiocarbamate in "cellosolve." Clear brown liquid; color (N.P.A.), 8.0 max. Sp. Gr. at 25° C., 0.964.

**Availability:** Commercial quantities. (O-19)

### Santoflex® AW

$C_{14}H_{15}NO$ M. W. 217.3

**Suggested Use:** As an antiweathering agent and antioxidant for natural and synthetic rubbers.

**Properties:** Condensation product p-phenetidine and acetone, primarily 6-ethoxy-2,2,4-trimethyl-1,2-dihydroquinoline. Dark, viscous liquid. Sp. Gr. at 45° C. 1.030-1.040. Flash point (C.O.C.), 250° F. min. Soluble in benzene, toluene, acetone, methanol, diethyl ether.

**Availability:** Commercial quantities. (O-20)

### Santolene® C Rust Inhibitor for light petroleum products

**Suggested Use:** Particularly suitable for inhibiting rust in lines and vessels used for transportation and storage of gasoline, kerosene and fuel oil.

**Availability:** Commercial quantities. (O-21)

### Santolube® 374

**Suggested Use:** As additive in formulation of heavy-duty motor oils. Imparts detergent-dispersant and corrosion inhibition properties. Also acts as pour point depressant.

**Availability:** Commercial quantities. (O-22)

### Santopoid® 32 All-Purpose Oil Additive

**Suggested Use:** Recommended for formulation of gear lubricants suitable for automotive equipment operated under conditions of high speed and heavy loads.

**Availability:** Commercial quantities. (O-23)

### Santowhite® L (Diamyl phenol sulfide)

$[(C_5H_{11})_2C_6H_3OH]_2S$ M. W. 499

**Suggested Use:** As a nondiscoloring antioxidant for foamed latex sponge and other rubber stocks.

**Properties:** Dark, viscous syrup. Phenolic odor. Softening point 0° C. Sp. Gr. at 25° C. 0.99. Soluble in benzene, toluene, acetone, diethyl ether; insoluble in water but can be emulsified easily.

**Availability:** Commercial quantities. (O-24)

### 2-Thiophenecarboxaldehyde (Thiophene-2-aldehyde)

$C_4H_3SCHO$ M. W. 112.1

**Suggested Use:** As a chemical intermediate in pharmaceutical and other fields.

**Properties:** Colorless liquid that darkens on standing. Miscible in benzene and alcohol, immiscible in water. Cr. Pt. −6° to −8° C. B.P. 90° to 95° C. at 25 mm. Sp. Gr. 1.2 at 25° C. Refr. Ind. 1.585 at 25° C.

**Availability:** Commercial quantities. (O-25)

### Veratrole (o-Dimethoxybenzene)

$C_6H_4(OCH_3)_2$ M. W. 138.2

**Suggested Use:** As an intermediate in chemical synthesis; as a solvent.

**Properties:** Colorless to pale-yellow liquid. Soluble in most organic solvents, very slightly soluble in water. M.P. 22.5° C. B.P. 207° C. Sp. Gr. 1.08 at 25°/25° C.

**Availability:** Commercial quantities. (O-26)

☆ ☆ ☆

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You can get information on any chemical listed on these pages simply by filling in the coupon below and indicating your wishes by circling the product key numbers. On the product descriptions, you will find the key numbers in parentheses at the end, and printed in red, like this: (P-1) or (O-2).

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| O-2 | O-9 | P-16 | O-23 |
| O-3 | O-10 | O-17 | O-24 |
| O-4 | O-11 | P-18 | O-25 |
| O-5 | O-12 | O-19 | O-26 |
| O-6 | O-13 | O-20 | |
| O-7 | O-14 | O-21 | |

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# Life ...on the

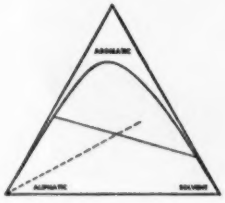
**FRUIT GROWERS** report excellent results in the control of pear psylla with THIOPHOS® Parathion. In the test shown, damage by psylla caused the defoliation of the Anjou pear tree, while the other tree on the left was protected against this pest by parathion. Fruit and vegetable yields generally are up where crops are protected by this insecticide against mites, aphids, red spider and many other insect pests.

## NEW PRODUCT NEWS

$O(CH_2CH_2CN)_2$ β,β′-OXYDIPROPIONITRILE

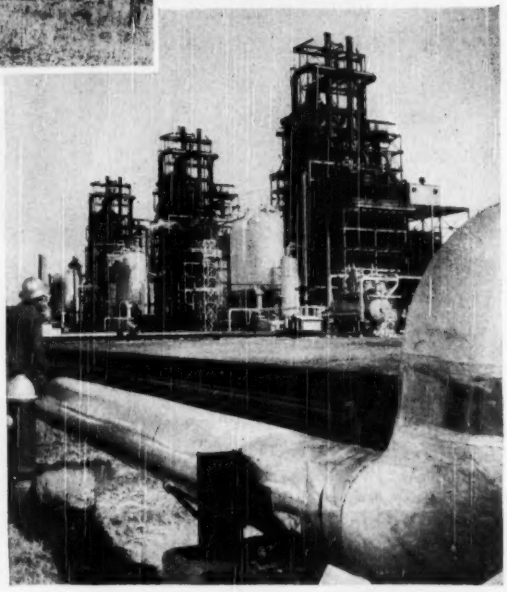
$S(CH_2CH_2CN)_2$ β,β′-THIODIPROPIONITRILE

$NH(CH_2CH_2CN)_2$ β,β′-IMINODIPROPIONITRILE




### Can the Dipropionitriles Help You?

The selective solvent action of the dipropionitriles makes possible the separation of mixtures of compounds that are difficult or impossible to separate by the usual methods. Other applications include the possible use of dipropionitriles in the purification of hydrocarbons and in refining tall oil, vegetable oil and wood rosins. To receive technical literature, check the coupon.



**CYANAMID BUILDS** in Michigan City, Indiana, to meet the increased demand of "cat" crackers for more fluid catalyst. This new plant will make available to the petroleum refining industry greatly increased quantities of AEROCAT® Microspheroidal Synthetic Fluid Catalyst. When completed the plant will supply the East, Middle-West and Canada, supplementing Cyanamid's Ft. Worth plant serving the West and Southwest.

# Chemical Newsfront

**FOR RUBBER PRODUCTS, A LONGER LIFE** that makes them more popular with consumers. Chief reason for this longer life: more manufacturers are using Calco's Antioxidant 2246. This new compound which slows the effects of oxidation is excellent for light-colored stocks as it doesn't stain or discolor. For more information use the coupon.

**FOR PRODUCTS THAT ARE POURED OR STORED,** light, compact paper containers are easy to handle and use. Chief pluses for the consumer are their disposability and cleanliness. Many containers in use today are made with paper treated with Cyanamid's ALWAX* Sizes. These sizes impart such desirable qualities as greater resistance to water and lactic acid as well as improved folding and scoring properties. For complete details, mail the coupon.

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Container courtesy American Can Co.

American Cyanamid Company
Industrial Chemicals Division
30 Rockefeller Plaza, New York 20, N. Y.

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- ☐ AEROCAT MS Synthetic Fluid Cracking Catalyst
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## PROBLEM...

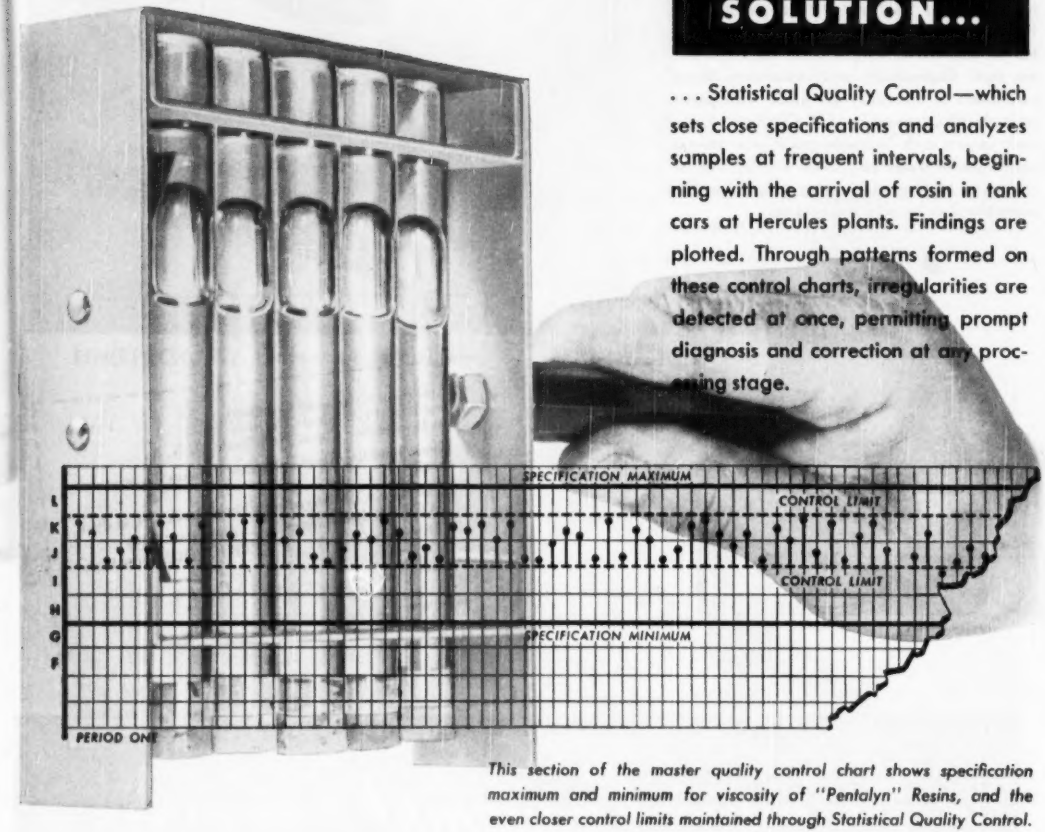
. . . to make good resins even better through closer control over the various steps in manufacture that influence viscosity, acid number, melting point, color, and other important properties.

# S.Q.C.

SOFTENING POINT
COLOR
ACID NUMBER
VISCOSITY

## SOLUTION...

. . . Statistical Quality Control—which sets close specifications and analyzes samples at frequent intervals, beginning with the arrival of rosin in tank cars at Hercules plants. Findings are plotted. Through patterns formed on these control charts, irregularities are detected at once, permitting prompt diagnosis and correction at any processing stage.




*This section of the master quality control chart shows specification maximum and minimum for viscosity of "Pentalyn" Resins, and the even closer control limits maintained through Statistical Quality Control.*

**HERCULES** SYNTHETIC RESINS · CELLULOSE PRODUCTS · TERPENE CHEMICALS

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With Statistical Quality Control, Hercules has been able to make good resins even better. There is promise, too, of continually improved resins, since quality control enables specification limits to be narrowed.

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. . . resins with a uniformity and consistent quality entirely new to the chemical industry. Customers now can select resins with the same confidence they select any chemical bought on a strict purity basis.

### Versatile New Ether

Hydroxyethyl Cellulose is an alkali-soluble, water-insoluble cellulose ether of good film-forming properties. Density 1.49 gm/cc and refractive index 1.534. In film form, at 25°C. Hydroxyethyl Cellulose is a white, tasteless, odorless, fibrous solid, insoluble in all common organic solvents, oils, fats, and greases; soluble in alkalies—e.g. 2% to 18% NaOH; 5% to 18% KOH. This new material is suitable as a starch replacement in flotation, a thickener for alkaline adhesives and resin solutions, a filler for thermosetting resins, a binder for paper coatings, a permanent size in textiles and a toughener for flocs used in water treatment. Other possible applications include textile printing media, inks, leather coatings. Two viscosity types are available.

### Microlab Speeds Research

With the addition of a new microanalytical laboratory to Hercules' research facilities, Hercules' chemists now are able to obtain data which otherwise could not be achieved without repeating syntheses on a large scale. In the new lab, midget-sized micro flasks, funnels and crucibles yield accurate data in grams to the fifth and sixth decimal places. Air is filtered free of dust and kept at a constant 70° temperature and 50% relative humidity, thus eliminating errors arising from variations in these conditions.

### Resin Emulsion Stabilizer

Hercules® CMC (cellulose gum) is used with considerable success as a thickening agent and stabilizer in rubber latex-based water paints; and to stabilize emulsion paints and lacquer emulsions. Viscosity in resin emulsion paints is easily controlled with CMC, and pigment suspension properties are improved—particularly after the paint has been thinned for application. CMC is also a useful aid in wetting pigments in aqueous pigment dispersions for leather and other products.

### Meet This New Film Producer

Hercules has developed a finely powdered metal caseinate which in ammoniacal solution readily forms a metal ammonium casein complex. Upon drying, the complex is broken, and an insoluble metal caseinate film is obtained. This film exhibits excellent water resistance and adhesive properties for pigments to many types of surfaces.

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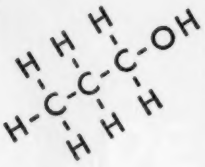
# CELANESE* n-PROPYL ALCOHOL



## *lower cost...greater volume*

Celanese production of n-propyl alcohol is now meeting large-scale demands. This straight chain alcohol—applicable to processes where its characteristic excellent solvent action and miscibility can be used to advantage—is available for shipment in drum or tank car amounts.

**PHYSICAL PROPERTIES**

| | | |
|---|---|---|
| MOLECULAR WEIGHT | | 60.09 |
| COLOR | | water white |
| ODOR | | characteristic alcohol-like odor |
| SPECIFIC GRAVITY | 20°/4° C | 0.8036 |
| DISTILLATION RANGE | ASTM °C | 2° including true boiling point |
| WEIGHT PER GALLON | 20° C | 6.7 lbs. |
| SOLUBILITY | | soluble in water and practically all organic solvents |
| FLASH POINT | open cup | 90° F |
| BOILING POINT | 1 atm. | 97.15° C |
| FREEZING POINT | | −127° C |
| ABSOLUTE VAPOR PRESSURE | 20° C | 14.5 mm mercury |
| RELATIVE EVAPORATION RATE | | 1.3 (butyl acetate=1) |

If you are looking for an improvement in your products, or short cuts in processing, the straight chain advantages of n-propyl alcohol are worth investigation. n-Propyl alcohol allows the solvent user greater solvent formulation freedom and can be used as a replacement and extender for higher alcohols. Call or write for additional information and specifications and a copy of the newly published Celanese Chemical Brochure.

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## PERCHLOROMETHYL MERCAPTAN

$Cl_3CSCl$

### PHYSICAL PROPERTIES

| | |
|---|---|
| **Boiling Point** | **68°C. at 52 mm.<br>149°C. with some decomposition at atm. pressure** |
| **Ref. index** | **$n_D^{24}$ 1.538** |
| **Color** | **Yellow** |
| **Odor** | **Stifling and unpleasant** |
| **Solubility** | **Soluble in organic solvents** |

## TYPICAL REACTIONS AND APPLICATIONS

1. Introduction of tri-chloromethyl group into a wide variety of compounds:

$$C_6H_5ONa + Cl_3CSCl \longrightarrow C_6H_5O\text{-}SCCl_3$$

is of interest to manufacturers of industrial organic chemicals and particularly manufacturers of insecticides, fungicides, lubricating oil addition agents, and liquid fuel ignition aids.

2. Reacts with various classes of amines and amino-type compounds as illustrated by the preparation of tri-phenyl guanidine:

$$C_6H_5NH_2 + Cl_3CSCl \longrightarrow C_6H_5\text{-}N{=}C(NHC_6H_5)_2$$

to produce isothiocyanates, tri-substituted guanidines, carbylamines, tertiary aromatic amino-mercaptans, and triphenylmethane dyes, of interest to both pharmaceutical and industrial chemical manufacturers.

3. It is also a suitable intermediate in the preparation of orthocarbonates, thiophosgene and many other unrelated compounds, giving good yields.

$$C_2H_5ONa + Cl_3CSCl \longrightarrow C_2H_5OSC(OC_2H_5)_3 \longrightarrow C(OC_2H_5)_4$$

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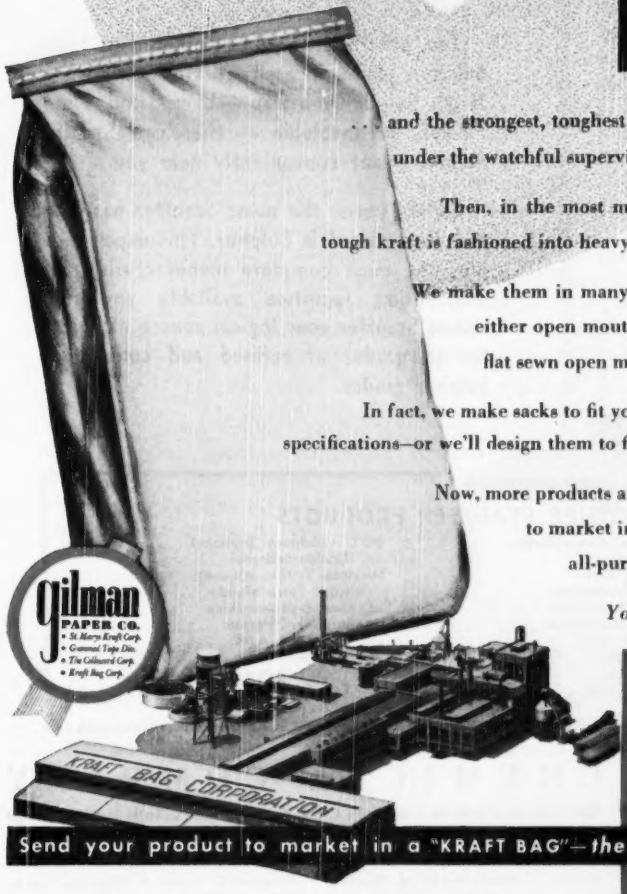


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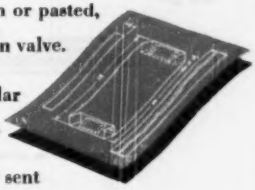

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# Chemical Industries

THE BUSINESS MAGAZINE OF THE CHEMICAL PROCESS INDUSTRIES

Newsletter,
November, 1950

You can expect to hear more about J. F. Pritchard & Co.'s "adsorption storage process" (CI, July 1949, p. 37). Designed originally for natural gas, it is now being considered by major chemical companies for transportation of ethylene on river barges between the Southwest and the Ohio River Valley.

Another major chemical company is considering adsorption storage of ethylene to avoid high-pressure gas storage or low-temperature liquid storage.

Water-base lacquers are a recent development of Hercules Powder Co. Ethyl cellulose, nitrocellulose and cellulose acetate are dispersed in an equal weight of water and ground to a particle size of 1-2 microns. Applied to surfaces and heated (e.g., 200 C for 30 seconds), the hydrosol dispersions dry and fuse to a continuous film. Modifiers can be added directly to the dispersions.

Advantages: lower cost, no toxic or fire hazards due to solvents. The materials are currently available in research quantities only, but several companies—attracted by potential savings—are adapting them to their processes.

* * CI * *

This month the Fraser-Brace Companies will complete the first of five electric-arc furnaces at Quebec Iron & Titanium Corp.'s $15-million plant at Sorel, Que. The company (2/3 Kennecott Copper Co., 1/3 New Jersey Zinc Co.) will process ilmenite to high-grade melting steel and high-titanium (70% titanium dioxide) slag for pigments (CI, January 1950, p. 24; May 1950, p. 681).

Plans call for operation of all furnaces by the summer of 1952.

First major change of the patent laws in over eighty years is now a distinct possibility. A Congressional bill, HR 9133, provides for general revision and codification, and hearings will probably get under way early in '51.

Of primary interest to the chemical industry are proposed changes that will allow "use" patents on old compounds, and that will set up objective tests to determine invention (replacing the nebulous "flash-of-genius" concept).

Drafted with the aid of various patent law organizations, the National Association of Manufacturers, and others, it is conceded good chance of passage.

* * CI * *

Production of additional benzene from petroleum has just been recommended by the Munitions Board, and as soon as the Board approves specific new facilities, the Department of the Interior will arrange for their construction.

Hydroforming, Platforming (UOP's platinum-catalyst process) and other catalytic reforming processes are being considered. Platforming is initially

expensive, but it converts practically all napthenic fractions to aromatics.

But for the long term, the Munitions Board is looking to hydrogenation of coal. Here the initial outlay is also high ($150 million for a plant producing 15,000 barrels of liquid fuel per day) but the benzene fraction should be competitive with petroleum benzene on a cost-per-gallon basis. Other fractions include toluene, xylene and phenol. The latter would ease benzene needs.

Now being formed within the chemical and food industries is a committee to advise the National Research Council's Food Protection Committee on the role of chemicals in foods and soils. The advisory committee will strive to foster an impartial, scientific, non-political approach to the study of synthetic fertilizers, pesticide residues, and the incorporation of chemicals in foods.

* * CI * *

The pinch in 55-gallon steel drums is beginning to hurt. Prices on used drums have already climbed to $4-$5, while new ones—if you can get them—are only $5.50. (During the war black marketeers got as much as $10 a drum.)

Pointing up the chemical industry's stake in the supply problem is the fact that this year's use of steel drums for chemical products is 42% above that of 1947. Some chemical manufacturers are now requiring a $10 deposit on each drum they ship. Luxury of tossing away drums after use will be a casualty of the war-economy belt-tightening. Non-returnable drums, extensively developed over the past few years, will be used again and again until conditions improve.

Steel drums are not alone: Paperboard is also becoming hard-to-get.

A new table salt additive to prevent caking is about to be launched by a major chemical company. Field tests have been quietly conducted in humid sections of the country, but commercialization is being deferred until the patent situation is clarified. Acid test passed: Salt shakers worked in New Orleans.

* * CI * *

Koppers Co.'s new hydrogen cyanide plant at Kearny, N.J., is scheduled to start operating late this month. This plant, which replaces the one that blew up some time ago, recovers hydrogen cyanide from coke-oven gases.

Rotation of crops is proving to be a source of trouble in the use of benzene hexachloride on cotton. Small residues of the insecticide in the soil are concentrated by peanut plants to a level (2 to 7 parts per million) where it imparts off-flavor to peanut butter. Sweet potatoes may also be affected.

* * CI * *

Here and There:

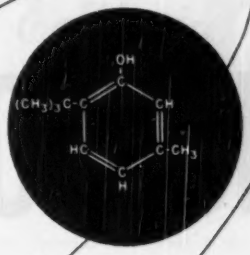
Insecticide formulations containing allethrin ("synthetic pyrethrum") are now accepted by the Dept. of Agriculture for use in gas-propelled aerosols.

American Maize Products has been flash-drying starch in a pilot-plant process, will soon construct a commercial (125 tons a day) plant at Roby, Ill.

The Editors

# KOPPERS MBMC

## Mono-tert-butyl-meta-cresol




**POTENT GERMICIDE**

**REACTIVE INTERMEDIATE**

KOPPERS Mono-tert-butyl-meta-cresol (MBMC), a clear, liquid alkylated phenol, is a powerful germicide. It has phenol coefficients of 30 and 50, as measured against test organisms such as Eberthella typhi and Staphylococcus aureus. These high phenol coefficients make Koppers MBMC valuable in the formulation of disinfectants and antiseptics, in the stabilization of emulsified cutting oils, and in the preservation of proteinaceous materials.

This versatile synthetic organic chemical closely resembles thymol in structure, with the isopropyl group of thymol replaced by the tert-butyl group of MBMC. It will undergo most of the reactions typical of the lower alkylated phenols. As an intermediate, Koppers MBMC is useful in the production of rubber antioxidants and in the production of the perfume fixative musk ambrette. It should also be considered as a raw material for rubber processing chemicals, lubricating oil additives, and synthetic resins.

## *Write for this bulletin and samples*

**Physical Properties of the Pure Compound**

Bulletin C-9-130 and experimental samples of Koppers MBMC may be obtained by writing to Koppers Company, Inc., Chemical Division, Dept. CI-110, Pittsburgh 19, Pennsylvania.

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# BICHROMATES

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# CONGRESS EYES CHEMICALS

*by W. ALEC JORDAN, Editor*

THE OBJECTIVE OF THE CONGRESSIONAL HEARINGS on the use of chemicals in foods is completely commendable: to safeguard the public health. From these hearings may well come better legislation—legislation which will mean an over-all gain for the nation and for industry. However, such new law can only be beneficial if it is clearly recognized that law itself is nothing else but reason. If the emotional harangues of food faddists and the biased testimony of spokesmen eager to promote the cause of special interests dominate the hearings, as has been the case too often in previous inquiries, the ends of progress and justice will not be served. Currently that is a real danger.

All laws must, perforce, be restrictive. They must be conceived to curb the activities of the "outlaw fringe" which exists in all classes of society and industry. Nonetheless, they must be workable and fair so that they do not impede all progress.

In that respect, the present Food and Drug Law is reasonably satisfactory. During the 12 years since it was enacted in its existing form the record of the food and chemical industries has been exemplary. The weight of the evidence indicates that enforcement has been by consultation and cooperation with the FDA and that the intent of the law has been carried out successfully.

However, some precautionary amendments do warrant consideration. The FDA suggests two: (1) A section on "new chemicals" analagous to the present provision for "new drugs." (2) The power to subpoena reluctant witnesses.

***There is no doubt that irresponsible*** additions of untried chemicals to food can be made without easy control (other than seizure) under the present law. The FDA should, most certainly, be empowered to deal promptly and effectively with such cases. But there is grave question as to whether it is desirable or practical to set up a cumbersome procedure of close and detailed FDA supervision of each new chemical development. The vast majority of new chemicals being considered will be carefully and thoughtfully evaluated. Most chemical companies, and many food concerns, maintain or support substantial research facilities and are aware of the damage claims they can incur by irresponsible action.

It would be more reasonable to require merely that novel chemical usage be reported to the FDA and that it should have the opportunity to investigate and the authority to veto proposals wherever the public interest so demands. This would not involve an elaborate formal procedure yet the end result would be satisfactory.

Moreover, the power of veto should not be placed solely in the hands of the FDA. It is undesirable to have the FDA set up as the final bureaucratic authority to make such decisions. There must be, always, opportunity for judicial review.

The advisability of vesting the Commissioner with broad subpoena power is also questionable. The present Commissioner and Deputy Commissioner are competent and seasoned administrators. But endowing an office with such power is hazardous. Succeeding, untested executives might use the authority unwisely. Or some political appointee to the superior office of Federal Security Administrator might be inclined to use political rather than scientific considerations in his ordering of subpoena.

***It would be quite adequate and much safer*** if the Commissioner were merely authorized to request subpoenas on his behalf from any appropriate Federal court. A reasonable judge could grant needed subpoenas, deny those of a "fishing expedition" character.

If the law is to be implementable it is likewise essential that the FDA draft a code of testing procedures it would regard as acceptable. And these test procedures must fall within the realm of reason. (Some testimony suggested that only "lifetime" tests on human beings would clear a new chemical for food use.) If the test requirements are not sensible the nation will lose far more, nutritionally, than it would gain by seeking the absolute ultimate in safety.

Only if proper consideration is given to all factors will any new legislation be sound, workable and broadly beneficial.

Law itself is nothing else but reason.

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5. **Cyclic Nitroalcohols**—condensing primary nitroparaffins with cyclohexanone.
6. **Alkyl Hydroxylamines**—formed by mild reduction of primary nitroparaffins.
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8. **Beta-Dioximes**—condensing three molecules of an NP in presence of a weak base.
9. **Trialkyl Isoxazoles**—hydrolysis of Beta-Dioximes (see above).
10. **N-Alkyl Hydroxylamines**—mild reduction of primary NP's.
11. **Alkylidene Succinic Esters**—condensing NP's with alpha beta unsaturated acid esters.

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CSC

# What's new

## RESINS GO THE WATER ROUTE

**Synthetic polymer emulsions, easy and safe to use, make better industrial, consumer products.**

A G.I. IN KOREA breaks open his ration box, curses the same old chow and tosses aside the weather-tight container that has kept the food unspoiled. A housewife in Denver repaints the living room with Sherwin-Williams' new Super Kem-Tone or Glidden's Spred Satin, watches her husband's jaw drop when he can't spot the usual brush marks and few missed areas. A New England chemical manufacturer specifies a resin-lined fiber drum for his product because he knows it's tough, looks good, and will deliver its contents in excellent shape.

Miles apart in space, different purposes in mind, each is relying on one of the fastest moving fields in the chemical industry to do his job better and faster: synthetic polymer emulsions.

Still in its infancy—B. F. Goodrich Chemical Co. and American Polymer Corp., for example, have been turning out their latices for only about seven years, Dow for even less—this facet of the resin business now offers at least a hundred products. Most of these polymers and copolymers are derived from probably less than a dozen commonly used monomers and are produced by emulsion polymerization. Availability of new monomers will undoubtedly mean a larger number of emulsions, but even without them, special types from currently commercial monomers as well as expansion of applications for established emulsions promise to keep polymerization kettles on a 24-hour schedule.

### Welcome Water

What's behind the swing of the process industries, particularly the adhesives, coating, textile, paper, and leather finishing fields, from natural materials and resin solutions to these dispersions of synthetic resins in water? Major advantages over natural products are improved properties that can be tailor-made to suit the use, uniformity, stability, freedom from spoilage, constant supply at stable prices. Emulsions are picked over resin solutions because they are easier, safer and cheaper to use, more adaptable to different application methods. They offer high solids at low viscosity since viscosity is independent of molecular weight. Non-stringy, they can be applied by spray, dip, brush or roller, knife coating. Particle size can be varied to give, for example, a material that will either penetrate or coat a fabric. Since they dry by loss of water, there is no toxicity or fire hazard from volatile solvents. There is no loss of costly solvents, and thicker films can be deposited.

*The Glidden Co.*

**EMULSION PAINTS: Boom in synthetic latices.**

On the debit side are these disadvantages: emulsifiers and protective colloids used in their preparation are present in films which are less clear and less homogenous than solution polymer films; waterproofness and water resistance are lessened by such hydrophilic impurities; films are less continuous than those cast from solution. These drawbacks can be overcome by heat-treating films and/or compounding emulsions with solvents and plasticizers; the record of growth of emulsions proves that their film properties approach those of solutions in practical use.

### Headline Item

Current interest centers on styrene-butadiene type latices. The layman knows of them through paint makers' national promotion campaigns for new washable emulsion paints in which these vehicles replace oil and varnish binders. Chemical manufacturers, mindful of that large market and of lesser known but equally fertile outlets, are hoping that there will be sufficient raw materials left over from the synthetic rubber program to permit full development of the new materials.

Next to the paint field, use of such high-styrene latices to replace casein, glue or starch in clay paper coatings has been outstanding. The finished paper has superior gloss, better ink receptivity and excellent flexibility. An improved oilcloth is being made by a few manufacturers who use such a latex instead of oil emulsions. In floor coverings, the latex binds clay in the barrier coats of linoleum on asphalt-saturated felt base, lends improved flexibility and bond. These latices also go into coatings for fiber wall board and ceiling boards, here replacing casein and natural gums.

Dow Chemical Co. has found these applications the main ones at present for its Latex 512K and related types. American Polymer Corp.'s high styrene copolymers, Polyco 350, 376, and 380, are finding much the same uses with additional outlets in the textile and leather fields. Other companies reaching all or some of these fields: Dewey and Almy (Darex high styrene copolymers); and Naugatuck Chemicals (Kralac modified styrene-butadiene or styrene-acrylonitrile latices, and Fralastic latices—combinations of modified styrene copolymers plasticized with acrylonitrile-butadiene latices). Goodrich's Hycar Latex 2507 is a high styrene copolymer type that is non-film-forming, is a reinforcing, drying and hardening resin for other types.

Monsanto Chemical Co.'s freeze-thaw stable polystyrene latex for paints is "post-plasticized"—latex is added to a plasticizer emulsified by itself to give a plasticized emulsion with a single internal phase.

Principal uses for 100% polystyrene emulsions are in bonding glass and rock wool fibers, carpet backing, water-base paints, greaseproofing wallpaper, and coating porous surfaces. Bakelite has two, BKS 92 which is plasticized, and BKS 90 which is used to harden films of other emulsions. Dow, too, has a series and Monsanto has Merlon S, a polystyrene dispersion for processing and finishing textile fibres and fabrics.

#### Leather, Textiles

Leather finishes, coatings, paper saturants and textile sizes and finishes are the main outlets for butadiene-acrylonitrile latices. American Polymer is in this field too, as is Naugatuck Chemicals with its Nitrex. The latter's Kandar, a modified acrylonitrile-isobutylene copolymer, is a permanent size, base for dry heat-sealing adhesives. Goodrich is well represented with a series of six Hycar modified butadiene-acrylonitrile products for different purposes.

Among the first of resins emulsions available, vinyl acetate polymers are probably made by more people than any other types. Some makers say a good fifty per cent of their production goes into adhesives—principally wood and general-purpose types—with textile finishing a close second. Other applications include specialty coatings, binders, and paint vehicles. Among the companies producing these types: Du Pont (Elvacet), Dewey and Almy (Darex X56L), Shawinigan Products (Gelva), American Cyanamid (Aerotex), Bakelite (Vinylite Dispersion W125), American Polymer (Polyco), and Monsanto (Merlon KR).

Polyvinyl chloride latices, being more water-resistant than the acetate types, having less blocking tendency, and giving a more durable film, go principally into coatings and adhesives. Goodrich produces a series of six under the trade name Geon, adds plasticizer during manufacture so that some types can be used without further plasticization. Bakelite's Vinylite Resin NV.4 is a solid copolymer of vinyl chloride (92%) and vinyl acetate that is dispersed in water before use. Dow's Latex F122A20 is a vinylidine chloride-acrylonitrile product that finds use as a base for resistant paint as well as in adhesives and paper coatings, while its Latex 744 is a new (May 1950) vinyl chloride-vinylidine chloride type of wide compatibility being used in paper and textile coatings, fabric bonding and industrial paints. Textiles are the outlet for Monsanto's Merlon BR, a 50% plasticized polyvinyl butyral dispersion.

#### Acrylates

Coatings to bind pigments on leather and textile finishes claim most of the output of the acrylic type emulsions. American Cyanamid's Aerotex 120 and 133 are acrylates designed for textile treating, while it has an ethyl acrylate-styrene and an ethyl acrylate-vinyl acetate emulsion to toughen paper, give the impression of a laminated plastic sheet. Rohm & Haas' Rhoplexes are an acrylic series available in a range of flexibility, hardness and tack. In addition to the textile industry, these are going into household plastic starches, and are of potential interest in paper coating, fabric coating, asphalt sealers, and modifying wax emulsions and adhesives. That company's related materials, Primals, are widely used in leather finishing. American Polymer has a series under its Polyco trade name for such uses as above, while Goodrich's Hycar Latex 4501 has the additional uses of treating glass fiber, providing sunlight- and ozone-resistant coatings.

Among methacrylate types, also used in the textile and leather finishing fields, are Du Pont's Methacrols and American Polymer's Polycos. One of Du Pont's series is designed to improve hosiery snag resistance in the mill and give an attractive appearance to nylons. Its other series is tailored for the leather trade.

While most of the types of emulsions fit into the above groups, there are some miscellaneous types of importance. The Lotol compounded latices of Naugatuck Chemicals can be composed of natural rubber, GR-S, neoprene, Nitrex, Kralac, etc. for a given application. Principal ones are tire cord dipping, dipped rubber goods, paper saturation, textile finishing, adhesives, and treating curled hair for seat covers. A product of interest to process men is Du Pont's Teflon dispersions, which make possible application of this outstanding heat- and chemical-resistant (but difficult-to-fabricate) material to process vessels, wire, etc. Another of interest is a tripolymer of American Polymer Corp., Polyco 337XS, which is a base for permanent textile finishes. Aerotex 110 of Cyanamid is an alkyd dispersion for textiles, while Aerotex 301 and 7513 are blends of melamine or urea-formaldehyde with alkyds for the same purposes.

Out of such a variety of products, it is difficult to determine the market different consuming industries represent except in rather general terms. One of the companies producing a quite complete line gives this breakdown on consumption of its products: adhesives, 50%; coatings, 15% (and growing fast); saturants for canvas, paper, etc., 10%; textiles, 25%. Dow, which is quite heavy in the styrene-butadiene types, says that about 40% of its dispersion materials goes into paints; 30%, paper; 15% textiles; and other applications, 15%.

Similarly, reliable statistics on total resin emulsion production are hard to come by. But from the growing number of products being put out by the many companies in the field, and the enthusiasm of both polymer chemists over possible new types and satisfied consumers over established emulsions, there is no doubt that bigger markets (barring possible defense curtailment of some types) lie ahead for emulsion makers.

## FLAKES WITHOUT IONS

**Wyandotte Chemicals Corp. buttresses its detergent line with a solid nonionic.**

ANIONIC detergents have a wide and lucrative market, as Wyandotte Chemicals Corp. has found to its joy with Kreelon, but it was obvious that some applications are better served by nonionic detergents.

Thus it came about some time ago that a team of Organic Department researchers under Les Lundsted started looking in unlikely places for a good nonionic—not just any one, but one that could crowd its way ahead in

PLUME AND LUNDSTED: Nonionicity and solidity.

rough competition. What they particularly wanted was a solid capable of being produced as free-flowing, dustless flakes—the form preferred by most detergent users.

The one they finally came up with contains an ethylene oxide chain as the hydrophilic portion (as do most other nonionics), but the hydrophobic portion of the molecule is of a type not previously used in surface-active agents. (Its actual composition will have to be a closely guarded secret until the patent situation is cleared away.)

The nature of the molecule makes it possible to create a series of agents, which Wyandotte has named Pluronics, varying in molecular weight and hydrophilic-hydrophobic ratio to yield a range of physical and surface-active properties.

Out of the infinite range possible, Wyandotte has chosen four products for market development purposes. Additional products of the series may be produced later to meet specific needs.

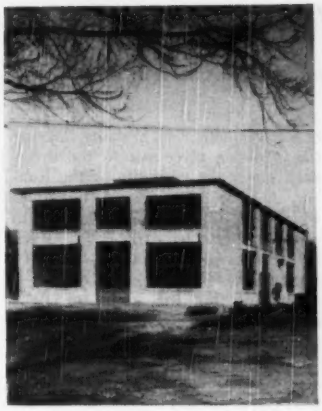
Frank Plume babied the products along from the laboratory to the pilot plant, where they are now being produced. Semi-commercial production is planned for the near future, and full-scale manufacture is expected to follow as markets expand.

#### Many Markets

The Pluronics range from liquids to hard solids (Pluronic F68, for example, melts at 51 C). Non-hygroscopic and soluble in polar solvents as well as water, the products are stable to boiling 25% caustic for 15 minutes and to boiling 10% sulfuric acid for the same length of time. Detergency and suspending action are high, and they are less irritating to the skin than ionic materials.

These are some of the properties that give Wyandotte great expectations for their new brain-children. The solid product is particularly suitable for compounding into detergent formulations, and since it is non-foaming, such formulations will be particularly suitable for mechanical laundry machines and dishwashers. Other potential applications cover the entire gamut of surface-activity: textile processing, metal cleaning, paper and leather processing, paint and cosmetic formulation, ore flotation, etc. Solubility of the products in organic solvents suggests usefulness in dry cleaning detergents.

The Pluronics are just taking their first commercial steps, but the combination of nonionicity—to coin a word—and solidity is one, thinks Wyandotte, bound to win friends among detergent users.



SUMNER'S UNIT: Poor relative makes a name.

## PAS UP, TB DOWN

**New medicinal use spurs production of previously obscure phenolic derivative.**

BRAND-NEW facilities recently completed by the Sumner Chemical Co. at Zeeland, Mich., for the production of p-aminosalicylic acid is evidence of increasing significance to the chemical industry. p-Aminosalicylic acid, poor relative of a successful family of dye intermediates, is now making a name for itself as a benefactor of mankind. Gainfully employed for the first time in its somewhat dim career, it is rapidly proving itself a powerful ally in the ever present war on the deadly Mycobacterium tuberculosis, causative agent of the dreaded disease.

#### Swedish Development

PAS made its bow in Sweden about three years ago after the discovery that its use shortened the course of treatment for tuberculosis patients undergoing streptomycin therapy. Ineffective when used alone, it was found that the resistance of the TB bug to streptomycin was markedly reduced and in many cases completely eliminated when PAS was administered simultaneously with the wonder drug. Although there is no generally accepted explanation for this happy phenomenon, it is believed that PAS throws a monkey wrench into the metabolic gears of the microbe, weakening its ability to resist attack by other more potent drugs. Haunted by the spectre of mass TB outbreaks resulting from war-induced malnutrition, European medicos were prompt to endorse the novel clinical weapon.

Effects of the new development soon spanned the Atlantic and late in 1947 the R.S.A. Corp. of Ardsley, N.Y., came out with the first commercial batch of PAS—destination Europe. Normal demand, aided and abetted by the promotional efforts of interested parties in this country, expanded the foreign market and put PAS on a more secure foundation.

#### Green Light from V. A.

Despite its cordial reception abroad, the American medical profession displayed no eagerness in pressing PAS to its aseptic bosom. It was a newcomer and to be regarded with suspicion until proved worthy of the treasured seal of approval. Not until November 1945 was approval forthcoming. At that time, in Atlanta, Ga., the 8th Streptomycin Conference, sponsored by the Veterans Administration, concluded after hearing numerous research papers that PAS and its sodium salt were of definite value in the chemotherapeutic treatment of tuberculosis. The green light was on for the chemical industry.

Response was immediate and new manufacturing facilities mushroomed. Costly, by virtue of the starting materials in its synthesis (e.g., *m*-aminophenol), and rigid purity requirements, PAS sold for $20 a pound early in 1949. One year later, it was down to $9 a pound and today it stands at about $6 with further reduction in the offing. This tobogganing of price, mute evidence of the tremendous increase in production and competition, created problems of its own. Prospective manufacturers ready to venture into the market were frightened away by visions of overproduction and vanishing profits, and many of the smaller producers were virtually squeezed out. Furthermore, neophyte European producers, mobilized to counteract the threat of being beaten in their own back yards, started their own price-slashing campaign. Nevertheless, a sizable portion of the export market was lost to American firms, and a further result was a cheaper but inferior European product, in many cases highly toxic.

#### Gains on Home Front

Home demand on the other hand, far from slackening off, has increased steadily. Sumner's new capacity, added to the several hundreds of tons of PAS produced annually by the American Cyanamid Corp. and Tennessee Eastman, along with more modest operators like Hexagon Laboratories, Inc., of N.Y., is ample proof of the importance of chemistry's latest gift to medicine.

*What's new*

# DEFENSE CASUALTY: POLYSTYRENE

**Ceiling on benzene supply limits output of styrene, most of which will be diverted to synthetic rubber.**

PLASTIC molders, who have had to contend with one shortage or another almost continually since the war, this month took a hard look at the latest defense casualty: polystyrene. Anticipating yelps of pain, the Society of the Plastics Industry reported on the future outlook to its molder-members last month. Presenting the report were Bill Cruse, SPI's executive vice president, and Roger Williams, Jr., chemical consultant. There wasn't even a sugar coating on the bitter pill they handed out.

### Memories of '42

Cruse and Williams could point to the calendar and show when the immediate trouble started: April, 1950, when the price of natural rubber started shooting sky-high from a level which was competitive with synthetic rubber.

Synthetic rubber technology is now at the point where the synthetic product is preferred for 15% of rubber use, natural is preferred for 35%, and in the remaining 50% it's a toss-up depending largely on relative price.

A switch to synthetic, then, was indicated for economic reasons even before June. The invasion of Korea, June 25, added impetus to reactivation of idle synthetic rubber plants. During the following three months the President, under the authority of the Rubber Act of 1948, issued directives which will raise GR-S production to capacity levels by early 1951. Even high-cost, alcohol-based butadiene plants were ordered open.

Remembering the lesson of 1942, civilians have rushed to buy rubber goods. Add defense needs and stockpile requirements to the already record high civilian consumption, and you get a dark prospect indeed for non-rubber uses of styrene.

### Dolorous Figures

What are the actual statistical data? First of all, available styrene capacity is 50 million lbs. a month. Full-blast rubber production, scheduled for next spring, will take 33 million lbs. (assuming the current formulation: 23½% styrene); miscellaneous uses, like styrene-based paints, will take about 2 million lbs.; and thus only 15 million lbs. will be available for polystyrene.

That 15 million lbs. is just about what polystyrene molders were using at the beginning of 1949, but demand has grown since then to almost 25 million lbs.

There are a few bright rays of hope from the molders' point of view: Synthetic rubber may not expand on schedule (although that would merely delay the day of reckoning). Butadiene shortages may limit GR-S production. Synthetic rubber makers may switch to new formulations, recent research products, containing little or no styrene (*CI, July 1950, p. 29*). And, most hopefully, improved operation may permit present styrene plants to produce as much as 5 million lbs. a month above rated capacity.

### Gets Back to Benzene

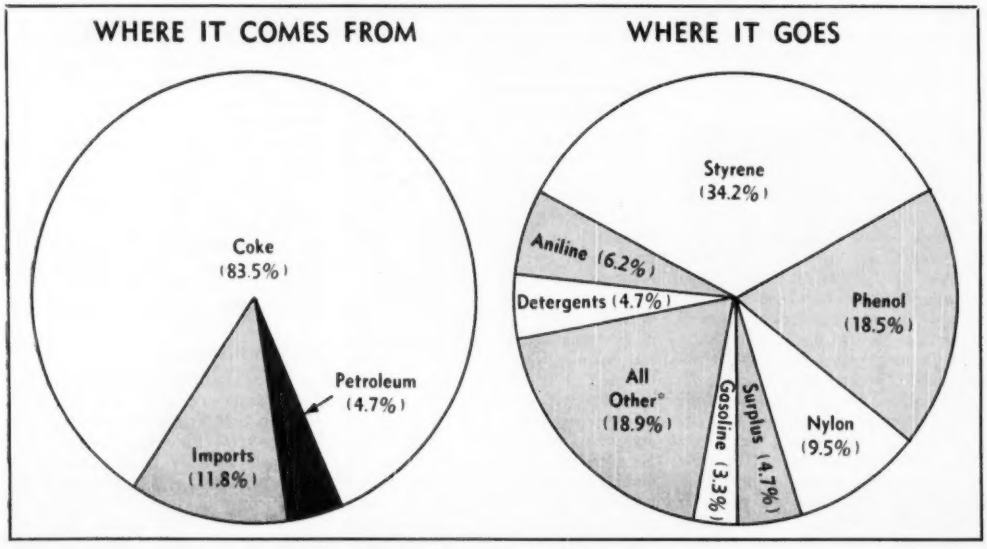
But the last possibility, as well as the possibility of styrene capacity expansion, depends ultimately on benzene supply.* And the outlook there is none too bright.

Examination of the accompanying "pies" would lead one to conclude that there is no benzene shortage—and that's right. It's right, that is, if one assumes (as the "pies" do) capacity styrene output and current production levels for the remaining benzene users.

But current production rates of phenol, aniline, and other benzene-consuming chemicals are lower than both demand and capacity.

Maintenance of even current benzene output is an "iffy" problem: if there's no steel strike, if there's no coal strike, if some of the old and antiquated coke ovens don't break down, if foreign supplies continue to be available.

*Shortages of ethylene might also curtail styrene output from time to time.




**BENZENE BALANCE:** The improperly fed are pale and wan.

ovens don't break down, if foreign supplies continue to be available.

**Long-Term Answer Needed**

Today's rapid rate of chemical expansion won't settle for mere maintenance of current benzene output; it cries for continued expansion—and lots of it. Where it will come from is one of the most serious supply problems facing the chemical industry.

Coke ovens, says SPI, are not the answer. Steel capacity is already so high that even large expansions, like those announced recently, add only a small percentage to potential benzene supplies.

Imports are an expensive, short-term answer. They can't be relied upon as the basis for concrete expansion of benzene consumption.

Petroleum as a source is certainly a long-term possibility, but the trouble is that the feed stock to a petroleum-benzene plant is high-octane gasoline. (One hope is that wide military adoption of jet-type engines will ease demand for high-octane fuel, thus releasing supplies for conversion to benzene.) In any event, however, the price of petroleum-derived benzene will reman high.

Coal hydrogenation is another possibility. Gasoline is the main product, but benzene is a substantial by-product. The Bureau of Mines' demonstration plant at Louisiana, Mo., is well known, and a major chemical company is reportedly building a commercial plant. How much benzene it will produce, and the price level dictated by the process, is not known. The amount will likely be small, however, relative to needs, and the price may have to be higher than current levels.

**What Can the Molder Do?**

In the light of these hard facts, what can the polystyrene molder do?

He might switch to cellulose acetate or acetate-butyrate—except that the short supply of wood pulp, cotton linters and acetic acid and anhydride virtually precludes output beyond the current 85 million lbs. annual production (even though plant capacity is higher than that figure).

What he can do is struggle along on whatever polystyrene he can lay his hands on and grouse at the rubber industry in his leisure time.

He thinks he has a legitimate grouse, for orders from Washington allow the rubbber industry to produce "defense" rubber over and above a civilian quota almost as high as the peak year of 1947. And even higher amounts are being granted to "hardship" cases. All in all, rubber consumption this year may reach an all-time high, and polystyrene molders wonder why they should get the short end of the stick while rubber producers operate full-blast.

But the polystyrene plight is only one symptom of the general benzene-deficiency disease. Until proper nutrition is restored, all benzene users will be pale and wan, and each will claim urgency for his debilitating malady.

## BUSINESS AS USUAL

WHETHER the chemical industry will be subject to National Production Authority allocation and limitation orders will depend strictly on the supply and demand picture. That's the word from Joseph S. Bates, newly appointed director of NPA's Chemical Division. It will be Joe Bates's job to look after the chemical industry segment of the national defense effort.

**JOE BATES: Supply and demand will rule.**

Bates comes to the job with a wealth of chemical and government background. After getting his Ph.D. from Yale in 1912 he was associated with Calco Chemical Co. He has also been with National Aniline (manager of development), General Aniline & Film (executive vice-president), Ciba Pharmaceutical Products (president and director), and Bates Chemical Co. (president). During World War II he was lieutenant-colonel in Ordnance, assigned to export control operations, and later he was with the Chemical Division of the War Production Board. After the war he surveyed I. G. Farben plants.

Still appraising the over-all situation, Bates won't commit himself on specific plans beyond the general policy expressed above. But informed opinion in Washington has it that military priority orders, now applied to food and petroleum industry chemicals, are enough for the present, and that allocation and limitation orders aren't needed.

## GLYCERINE DIVIDEND

**Epon resins, new class of polymers based on epichlorhydrin, go into large-scale production at new Shell plant.**

SHELL CHEMICAL CORP. this month clipped another coupon on its stock in synthetic glycerine as it brought into production at Houston, Tex., the first large-scale plant for making a unique class of resins called Epons.

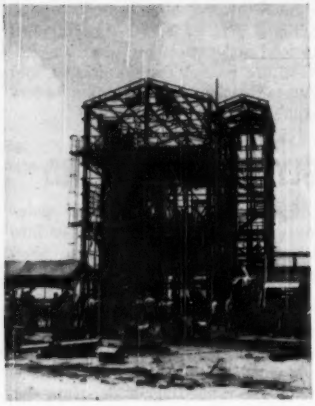
These are condensation polymers of bis-phenol (formed from acetone and phenol) and epichlorhydrin, which, in Shell's famed glycerine-from-propylene synthesis, is a welcome extra dividend. The new materials are characterized by a combination of properties that surface coating chemists dream of: excellent adhesion, superior chemical resistance and outstanding flexibility.

Key to the resins' properties is their chemical structure. Because they are linear polymers with either carbon to carbon or ether linkages, their chemical resistance in contrast to an ester linkage is very good. Reactive hydroxyl and epoxide groups are widely spaced along the chain, resulting in flexibility in the cured resins after the chains are thermoset by cross-linkage. Outstanding adhesion results from the polar nature of the molecule, while the phenolic hydroxyl group, often a source of poor color in polymers, has been etherified; hence good color and color retention are generally characteristics of the Epons.

**Joint Account**

Sharing with Shell much of the credit for the new resins is paint-maker Devoe & Raynolds. The latter worked with the raw material supplier on development of formulations and manufacturing methods. This, followed by application studies, has resulted in acceptance of Epons for a variety of uses, although they have been available only on a more-or-less pilot-plant scale up to now.

Devoe & Raynolds itself is one of the paint companies offering formulated surface coatings based on these materials. Its 87 Spar Varnish is one example. Among others are Maritime Laboratories, Compton, Cal. (Camerlene Clear Protective Coat), and Rin-



EPON PLANT: Structure is the key.

shed-Mason Co., Detroit (Epon Primer G-9561).

Satisfied industrial users include Whirlpool Corp., St. Joseph, Mich., which uses Epon coatings to protect its Whirlpool and Kenmore washers from corrosive action of alkalies, moisture and bleaches; and Rheem Manufacturing Co., which roller coats Epon linings in its new drum manufacturing procedure. The flexibility of these resins has been responsible for their use where metal must be crimped after coating, and their chemical resistance provides coated containers suitable for food, beverages and chemicals.

#### Four To Pick From

Four different resins are available: Epon 1001, 1004, 1007 and 1009. They increase in molecular weight with number, with the lowest-molecular-weight product being the most compatible with other resins and having the greatest solubility. They can be used in blends with other types of resins such as alkyds, melamines, etc., to impart particular properties.

Epon 1001 is commonly used unmodified and finds principal application in industrial baking enamels. The only one commonly used in modified form—as a fatty acid ester—is 1004, which has its main outlets in varnishes, spar varnish, "wipe-on" type finishes and floor finishes that must withstand severe service conditions. The two other types are generally used unmodified, with the 1007 going into industrial primers and baking enamels, can coatings and drum linings, and 1009 going into wire enamels, can coatings and tank linings.

Customers who have tried the Epons are enthusiastic about them. Shell naturally is none the less so. Not only does it have what it considers "the greatest thing to come along in the coatings field since styrenated oils," but it also has a unique position in that field. It makes acetone and epichlorhydrin, being sole manufacturer of the latter, and has only to purchase phenol for the new products.

Moreover, as the only manufacturer of synthetic glycerine, it has a big stake in the alkyd business, and the Epons complement this interest. Should the new resins cut into alkyds appreciably, or should demand for glycerine slacken (fairly inconceivable at present), it can always make less glycerine and more epichlorhydrin. Either way, the company's chemicals-from-gas pioneering will still be paying dividends.

## SULFUR LAMENT

**Sulfur price jumps 22%, further increases in the offing.**

BIG NEWS this month was a jump in the price of elemental sulfur from $18 to $22 per long ton.* Bigger news in the future: further possible price increases as now-marginal sources are brought into production to slow present rapid depletion of the once-huge Gulf Coast reserves.

But even that isn't the end. There simply isn't enough elemental sulfur in the U. S. to continue meeting the needs of current sulfuric acid production—a record 12 million tons* a year. As the supply is depleted, price of sulfur will rise to the point where pyrite (iron disulfide) and by-product sulfur sources can be brought into production. Reason for the current price rise, as a matter of fact, is cited as the desire to bring in marginal production and encourage exploitation of pyrite to take some of the pressure off the overburdened elemental sulfur industry.

The current price rise will add about $1.50 per ton to the cost of producing sulfuric acid from elemental sulfur, and thus all sulfuric consumers —which means all industry—will be directly affected.

#### Not Alone

Even today, of course, not all sulfuric acid is derived from elemental sulfur. Under favorable circumstances roasting of pyrite or metallic sulfides is competitive, and increasing use is being made of sulfur recovered from refinery gases and natural hydrocarbons (*CI, Feb. 1949, p. 210*). Coke oven gases are also utilized, but the extent, like that of "petrosulfur," represents only a small portion of the total potential. Even if all the gases were subjected to sulfur recovery, however, it is doubtful that the sulfur yield would exceed a very minor percentage of total requirements.

Sulfates—particularly gypsum and anhydrite, both forms of calcium sulphate—are a huge potential source of sulfuric acid, but they have never been utilized in this country because of high production costs. A plant in England was spotted directly over a large gypsum deposit, but it is now operating on elemental sulfur.

#### Domestic Domes

At present, most of the elemental sulfur is mined by the Frasch process (hot water under pressure melts sulfur and compressed air forces it up) from Gulf Coast salt domes, which extend from the Rio Grande Valley to Alabama. Seven domes (six in Texas, one in Louisiana) in the hands of four companies account for all current production, and Texas Gulf Sulphur Co.'s Boling Dome probably produces twice as much as all the others together.

A total of 194 domes have been found, but only the seven mentioned and five others, since abandoned, have been used. The domes must conform to rather rigid geophysical requirements to be economically useful, and the great majority are unsuitable for the Frasch process.

The underground structures of the whole Gulf Coast have been so thoroughly explored for oil, it is extremely unlikely that new sulfur deposits will be found there. Southern Mississippi and the Continental Shelf are possible exceptions. Some domes have indeed been found on the Shelf since surveys were undertaken in 1944, but some are 40 miles from land and under 20 to 40 feet of water. They can be made to yield sulfur, but not economically: An offshore oil well is all right, for one well can tap a large surrounding area; but a Frasch-type sulfur well mines only a small area, and the high cost of underwater drilling makes cost of recovery prohibitive.

#### Not Much Left

The sad truth is, there isn't much Frasch-mineable sulfur left. In 1944 the Bureau of Mines and the U. S. Geological Survey estimated total elemental sulfur reserves at 82 million long tons. By the end of this year 25 million of those tons will have been

* Sulfur is customarily quoted in long tons (2,240 lb), sulfuric acid in short tons (2,000 lb). Overlooking this often creates confusion in calculating equivalent prices and tonnages.

SULFUR: All paths spell the same two words.

taken out of the ground, leaving only 57 million tons. At current production rates—5 million tons a year—that's only 11 years' supply. Assume, as you probably can, that the estimate was conservative and that there's really 15-20 years' supply. That's still a relatively short time, and then, unlike the continually up-revised petroleum reserves, there won't be any more.

What then? First of all, there are surface deposits in West Texas, Utah, Oregon and California. But these, like the more extensive deposits in Sicily and Italy, can't be exploited by the Frasch process. Despite extremely low labor costs, Italian producers have had great difficulty in marketing their product in competition with U. S. sulfur.

Outside of the U. S., salt domes are found on the Gulf side of the Isthmus of Tehuantepec, in the south of Mexico. Forty-one known and inferred domes have been found, but while there has been some drilling and prospecting activity during the past few years, little if any production is currently under way. The geology looks promising, and despite jungle difficulties and distance from consumption areas, the deposits may eventually provide considerable tonnages of sulfur.

#### Pyrite Best Bet

In the light of the total situation, it appears that industry will have to shift, some years hence, to other acids where possible or other sources of sulfur; and for the latter, pyrite looks like the best bet. Straw in the wind: One major producer is reportedly buying up pyrite deposits.

Even so, a long-term price climb is in the cards. A sulfuric acid plant based on pyrite costs 2½ times as much to build and nearly 5 times as much to operate as one burning elemental sulfur.

The picture is not an unrelieved black. Pyrite supply, for one thing, is large. Reserves are estimated at 158 million tons—a 25 years' supply—and there is greater chance of further discoveries since pyrite is found literally from Maine to California. There are also tremendous reserves in Canada and Mexico.

Also, the rising value of iron ore makes co-production of sulfur from pyrite correspondingly cheaper. The iron residue can be sintered into ore.

#### Freight Rate Spectre

But the lower sulfur content of pyrite raises another ugly spectre: freight rates. An additional cost increase follows from the fact that pyrite at best is only 53% sulfur, and one thus has to move almost two tons of freight to ship a ton of sulfur. Under these conditions, however, the economical shipping radius of sulfuric acid will be greater, and the problem is fortunately minimized by the fact that pyrite is found all across the continent.

The spectre presents a kindly countenance to sulfide ore smelters. Producers of zinc, lead and copper will be able (at the higher prices prevailing then) to expand the shipping radius of their by-product acid, thereby adding profits, minimizing annoying waste disposal problems, and reducing primary sulfur demand.

The world will never run out of sulfur, but depletion of the Gulf Coast bonanza will certainly force a drastic reassessment of sulfur economics. There is no single ultimate solution, but all the diverse paths through the tangled maze spell the same two words to the future sulfuric acid user: higher cost.

## MESH UPS OUTPUT

**Wire cloth entrainment separators speed up evaporation, distillation and absorption processes.**

ONE LOOK at the fine spray formed over a pan of boiling water shows up a problem common to all processes—such as distillation, evaporation and absorption—where a gas or vapor breaks through a liquid surface: loss of operational efficiency as a result of entrained spray.

This month plant operators and designers are inserting mats of knitted wire cloth (made by Metal Textile Corp., Roselle, N. J., and Otto H. York Co., East Orange, N. J.) between trays on bubble-cap distillation or absorption columns, and ahead of the condensers or between evaporators in multiple-effect evaporation systems. These mats enmesh the entrained mist, prevent it from being carried along in the process.

Without a means of separation, output rate of a given piece of equipment is limited, for vapor velocity must be kept low enough to prevent a mist problem.

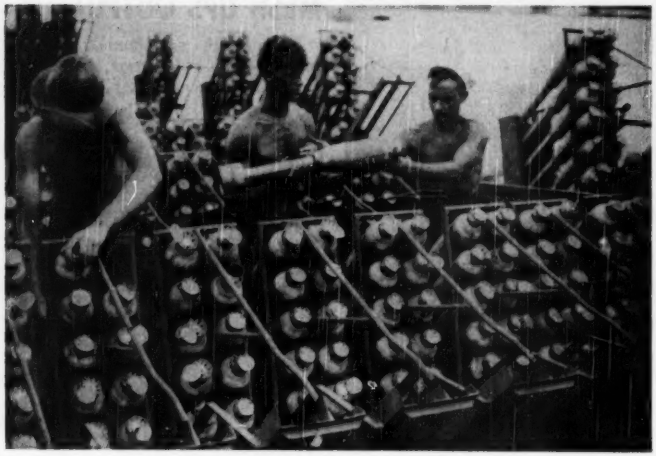
#### Was a Baffling Job

Before mesh, entrainment separators for evaporators (few if any were used in distillation or absorption columns) consisted of a series of baffles or a cyclonic separator. Impingement of the particles on the baffle surfaces caused them to coalesce, or centrifugal force threw the particles out of the vapor stream. In either case the pressure drop was high—too high to be handled conveniently in the high-vacuum portions of multiple-effect evaporators.

But a mat of knitted wire cloth 2¼" to 6" thick, placed between the bubble trays of a column, will catch 98% of the entrained mist—and at vapor velocities several times as high as permissible velocities without entrainment separation. The pressure drop, too, is usually less than ½" of water. The pad, although containing much free space, has few if any openings that go straight through. It serves, in effect, as an impingement-type separator but without the usual high pressure drop. (Where the mist deposits a solid on the mat surface, incidentally, it is simple to install a continuous wash.)

#### Big Chance

Mesh manufacturers are hopeful that the current emphasis on high production coupled with the long delivery times of additional equipment will give their product its big chance to show what it can do.



PASSING THE AMMUNITION starts in the laboratory.

# DEFENSE MEANS DEVELOPMENT

**Specific technical needs of the Army, Navy and Air Force are revealed to the men whose business is development.**

"WELL . . . since you asked, gentlemen, here's what we would like in the way of technical developments to keep the armed forces at peak combat efficiency." This was the topic and tone of technical representatives of the Army, Navy and Air Force as they spoke to a so-crowded-you-had-to-sit-on-the-floor meeting of the Commercial Chemical Development Association and the Chemical Market Research Association in Washington, D.C., early this month.

As uniforms with varying insignia took their turns on the speakers' rostrum, notebooks appeared in the hands of several members of the audience. This seemed to bear out the fact that a high percentage of the requests that droned from the P.A. system stand a good chance of being satisfied. If they aren't it won't be because they weren't specific enough.

The Quartermaster Corps representative, for instance, plunged right into the problem of what technical developments were needed to assure the health and comfort of the combat soldier. Fuel tablets with which to heat rations in the field have been a major problem. Many have been developed, he explained, but most seem to have some bad defect. And the materials for those which are satisfactory are difficult to obtain commercially. A cheap method of preparation for diisopropylidine glyoxal, a promising tablet material, would help solve this problem.

An all-purpose soap bar, which can be made from either a synthetic detergent-tallow soap combination or synthetics completely, is another item that would improve the soldier's comfort. But it must be truly all-purpose for cleaning person, mess gear and clothing in hard, soft and salt waters. In addition this wonder-washer must also lend itself to the purposes of shaving.

The cosmetic requirements of modern combat also demand the development of an insect repellent that a man can rub on himself and secure continued protection for periods up to twenty-four hours. Present repellents do the job, it seems, but not for a sufficient length of time. The fault doesn't lie in the volatility of the repellent compounds but in their inability to remain on the skin surface. Perspiration or body oils refuse to let them "stay put."

### Gentle Textile Chemicals

Lighter, non-toxic flame-proofing compounds for textiles that will not degrade the fabric or corrode metal parts with which they may come in contact are another aim of the Quartermaster Corps. Similarly, non-toxic fungistatic agents for wearing apparel are also high on the list of desired textile chemicals.

The Quartermaster Corps spokesman also touched on the problem of plastic films for packaging and claimed that the present shortage of polyethylene makes it necessary that work be done on the development of an improved plasticizer for vinyl films that will extend their use in food packaging. While on this same subject of food packaging he put forth the need for a rapid drying, tough, corrosion-resistant coating for the exteriors of food cans made from black plate instead of tin plate. Such a coating would have to afford corrosion protection as well as camouflage properties.

Other items the Quartermaster Corps representative asked for included a tough but flexible coating for the interiors of gasoline cans and as many synthetic tanning agents as are necessary to replace the natural agents which have a habit of going into short supply in times of war.

The Chemical Corps speaker began his list of needs with a plea for a better "first-fire" mix, that part of the charge of an incendiary bomb that ignites the thermit which in turn ignites the magnesium. This priming charge often deteriorates upon storage, he explained, necessitating its removal and replacement. A more age-resistant "first-fire" mix seems to be needed.

Other burning-type munitions such as smoke grenades, smoke pots and tear gas grenades also offer problems. The main one is that of setting up specifications for the ingredient chemicals that will assure uniform results in performance.

### Heatproof Dyes

Dyes that can stand the combustion temperatures of colored smoke bombs or grenades are few and far between. And those that are used are not wholly satisfactory in characteristics. This presents another problem for the Chemical Corps and industrial chemists to solve.

Better plastic formulations and improved molding techniques are two other fields in which the Chemical Corps is asking for assistance. Valve parts for gas masks and plastic ignition caps for smoke pots have on occasion proved unsatisfactory due to warping, the Chemical Corps spokesman said.

Also needed by the Chemical Corps are a corrosion-resistant lining material for gas shells and bombs, clearer specifications for the activated charcoal filters in gas-mask canisters, and non-toxic synthetic rubber-based fabrics for protective clothing.

The Signal Corps spokesman topped his list of needs with a request for improved insulating materials that have a high resistance against the deteriorating effects of oxidation hydrolysis, actinic energy and moisture absorption

which results in the debasement of the dielectric characteristics of the materials. In this same regard he added that the Corps was also interested in the improvement of the molding characteristics of silicone molding powders, the development of phthalocyanine compounds as insulation on bare copper and diene polymer hydrogenation.

Work on dry cells also demanded a considerable portion of the Signal Corps plea for assistance. Here, a better way of making acetylene black or a suitable replacement was mentioned. And emphasis must be placed in developing this material, the speaker added, upon good electrical conductivity, chain structure and small particle size.

Better corrosion inhibitors were the first request from the spokesman for the Navy at the meeting. Coupled to this was a plea for more effective antioxidants capable of performing at the higher operating temperatures of some of the newer navy engines. Navy interest seems to center on derivatives of phenothiazine as a possible answer.

#### Safer, Surer Lubricants

Another concern of the sea-going part of the armed forces is in the development of non-hazardous lubricants and hydraulic fluids. Development activity here seems to lie along the line of di-ester fluids, fluorolubes and stable alkyl phosphonates.

But there are other problems pressing for attention in the high temperature field. The soaps which are used to thicken oils to produce greases, for instance, are often oxidized at the high temperatures of use to products that break down the desired grease structure. For this reason new jelling agents are needed and it is possible that they may be found among entirely different classes of chemicals.

Air Force demands landed all over the field of technical development work. The spokesman for the winged arm of defense emphasized a need for lighter, tougher and more heat-resistant materials. In addition he placed a bid for better metal-to-metal adhesives for use at high temperatures. These materials at present are synthetic rubber-phenolic combinations or phenolic-vinyl resin combinations. But the Air Materiel Command still isn't satisfied.

Better rocket propellants, rust preventive oils, and cleaners for stainless steel rounded out the chemical based request of the Air Force.

All in all it seems that the Armed Forces have set quite a problem for industrial technologists . . . but they asked for it!

# HUMAN ANALYZERS

**Human beings are more erratic than instruments, but new techniques add precision to sensory testing.**

JUDGING materials by taste, odor, texture and appearance is older than the human race itself. Even prehistoric animals undoubtedly chose their food by such "organoleptic" (i.e., sensory) means.

But individuals vary widely in sensory perception (some even mix ginger ale with their scotch) and a single individual varies from day to day, depending on his mood, his physical state, and other factors. And so in spite of the high sensitivity of nose and tongue and eyes and fingers, individual judgments are notoriously untrustworthy.

L. C. CARTWRIGHT: Improving on old Joe.

#### Scientific Technique

What's new—and that means largely within the past ten years—is the adaptation of various scientific techniques to organoleptic testing, making its subjective judgments as accurate and reproducible as many objective tests.

And what's newer—and that means right now—is the trend toward a more general application of organoleptic testing. Its use in testing foodstuffs, beverages and perfumes is obvious and well-known, but it has applications as well in general process control where no inanimate instrument is sensitive enough to do the job.

#### Why Organoleptic?

No one would depend on somebody's say-so if he could use an instrumental test instead, but the fact is that no instrument ever devised can critically evaluate the smell of paint solvent, the palatability of hot rolls, the bouquet of a perfume, or the texture of hollandaise sauce. There are instruments, to be sure: "tenderometers," "stinkometers," etc.; but at best they tell only part of the story.

The final judgment depends on the senses, and that judgment will be only as valid as the sensory evaluation is precise.

It has been Carl Cartwright's job, at Foster D. Snell, Inc., to crack the whip over human senses, making them behave predictably and reproducibly so that their judgments will have a valid meaning.

#### Choosing a Panel

To minimize individual aberrations, Cartwright uses a panel of testers—never less than three, rarely less than five, and often up to fifteen.

But it isn't enough just to bring a motley group together. Each panel member is selected on the basis of his ability to perceive differences among samples in the particular property being tested. Selection must be made for each test, for a panel member may be keen on the taste of cocoa but completely obtuse on the smell of shoe polish.

Also, his sensory judgment must correlate with popular conceptions of goodness and badness: If he has a penchant for pickles with whipped cream, his evaluation of food flavors is subject, for obvious reasons, to grave suspicion.

The selected panel members are then trained to recognize the properties under examination and the criteria of evaluation, and to express their evaluations on a numerical basis.

#### Significance of Data

In operation the panel functions as individuals, none of them knowing how the other members rate the various samples, and the samples themselves are coded so that there will be no preconceived idea of how a particular sample should rate. Each member then rates the samples on the numerical basis assigned to each particular property.

The over-all data are then handled statistically, mathematical tests being applied to determine whether the differences are significant. Analysis of the results also provides a check on the panel members, showing whether an individual's judgment can be relied on.

A trained panel is surprisingly accurate: Rescoring of a sample, which may be in the range of 70-90 (basis

of 100 as perfect score) is rarely more than two or three points off the original score.

#### Many Applications

Cartwright has used the panel technique on a diversity of problems. A cocoa manufacturer accepts or rejects lots of packaging material on the basis of organoleptic tests on his product aged in contact with samples of the packaging material.

Detective work on contaminations is another phase of his work. He once traced the off-flavor in baked goods to the presence in the bakery air of two to three parts per million of a chlorinated phenol which drifted downwind from a nearby chemical plant.

An unpleasant odor in a shipment of cigarettes was found due to benzene hexachloride in the packaging material, and organoleptic measurement of the concentration (0.005%) by evaluating boxboard impregnated with known quantities of the chemical led eventually to the conclusion that a bag in which the insecticide had been packed found its way into the scrap paper from which the cartoning material was made. In this case, no chemical test would have sufficed to identify or quantitatively measure the contaminant.

#### On the Threshold

Many food and beverage processors use organoleptic testing to maintain product quality, but it is to such consulting firms as Foster D. Snell, Inc., Arthur D. Little, Inc., Wallerstein Laboratories, and Food Research Laboratories, as well as government and university groups, that most credit must be given for extending the range and usefulness of the method.

Organoleptic tests were common before technology outgrew art and became science. In those days "old Joe" out in the plant could tell by looking or feeling when a batch of grease or a dye lot was just right. After that came the bright and shiny instruments with dials and pointers.

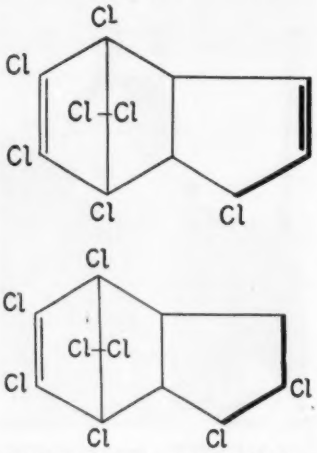
Now, thinks Cartwright, the pendulum is swinging the other way. "Old Joe" was unreliable, but the new panel technique redresses that disadvantage. More significantly, instruments can't cope with the subtle but all-important criteria that add up to consumer acceptance of foods, beverages, soap, cosmetics, paint, lotions, and polishes.

These criteria—too elusive to be caught in the analytical control laboratory—can make or break a product, and organoleptic control, concludes Cartwright, can make it.

## SEVEN UP

**A just-developed insecticide heads for tonnage output. Prime target: cotton bug killers.**

EVER SINCE DDT showed chemical men that millions of dollars could be harvested from the development of a synthetic insecticide, research activity in the bug-killing business has been little short of frenetic. Hundreds of novel chemicals have been created and painstakingly evaluated as potential insecticides. But of these hundreds only a scant dozen have made the tonnage grade. But early next year it will become a round baker's dozen




**HEPTACHLOR (top) AND CHLORDANE: Feuding cousins.**

when Velsicol Corporation brings in a new plant to produce a healthy tonnage of a brand new insecticide.

#### Chlordane's Cousin

Birth of the new product, conveniently christened heptachlor, stems from Velsicol's early work with chlordane. In the course of that research, Velsicol's laboratory researchers conceived the possibility of the existence of another molecule rather closely akin to the then-new chlordane. Perhaps, they reasoned, it too might be endowed with insecticidal promise—at least it should be isolated and appraised. So they set out to isolate the new compound from technical chlordane; shortly thereafter they developed synthesis procedures.

By 1948 economical methods of production based on the Diels-Alder reaction of hexachlorocyclopentadiene and cyclopentadiene were devised.

Empirically, heptachlor is $C_{10}H_5Cl_7$; specifically, 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-4,7-methanoindene.)

The two year hiatus between process development and the upcoming introduction of the new insecticide were tumultuous ones for Velsicol and, as a consequence, heptachlor was comparatively neglected. Primary attention had to be paid to legal matters—to the bitter battle which waged between Velsicol and Julius Hyman & Co. in which the chlordane patents were at stake. It was not complete neglect, however; entomological studies on the new toxicant were quietly pursued at the University of Illinois (domestic housefly), at the Riverside Citrus Experiment Station (fruitfly), and at Ohio State University (roaches).

Now, with the chlordane patent securely in hand, Velsicol is pushing heptachlor into large-scale production, is counting on bringing in the first unit at its Marshall, Ill., plant early next month. Charted output for next year: substantially more than a million pounds of technical heptachlor.

#### Toxicant or Insecticide?

There is, of course, a wide chasm between toxicant and insecticide. Multifarious chemicals can be neatly categorized as toxicants, but a harmonious balance of physical and chemical properties are required to elevate a toxicant to a practical insecticide. Stability, odor, vapor pressure, solubility, crystal structure—all are factors, and all important. However, Velsicol, an old hand at the insecticide game, chalks heptachlor up as having that money-making balance.*

Vapor pressure, especially, it regards as a prime asset. Heptachlor has a very low vapor pressure at ordinary temperatures (although slightly higher than that of DDT and chlordane) which is conducive to good residual effectiveness. But its residues are not as long-lasting as those of these other two compounds—an advantage in seeking FDA approval for spraying edible crops, particularly fruits.

Odor-wise, heptachlor is mild, camphor-like. Too, it is readily soluble in organic solvents and is stable to light, moisture, air and heat (up to 150° C). Crystalline in character, it

* Hurdle still to be cleared: All chemicals must be accepted by USDA for registration before they can move into the commercial insecticide category. Until commercial grades are available official use recommendations are not possible.

is readily blended with inert diluents such as diatomaceous earth, pyrophyllite, kaolinite, etc.

**Multiple Action**

Insecticidally, heptachlor appears to have a multiple effect on insects, acts as a stomach poison, contact insecticide and fumigant. Roaches, flies, mosquitoes and ants fall prey to extremely low concentrations of the new chemical. (Two years ago the basement of a large university administration building, which had long been infested by American roaches, was sprayed with a 2% emulsion of heptachlor. No reinfestation has occurred since that time. It is doubtful, however, that the residual effect would be this long-lasting; rather, it highlights the eradication effectiveness of the compound when coupled with subsequent sanitation.) The agricultural field, wherein tremendous tonnages of insecticides are consumed, is the odds-on favorite for Velsicol's prime exploitation.

During the past season, lab-prepared samples have been distributed to a large number of experimental stations. All the results aren't in yet, and all the observations haven't been evaluated. These few findings, though, are especially significant: a dosage of 0.1 lb. actual heptachlor per acre—in the form of a spray or dust—exterminated grasshoppers; as little as four ounces per acre proved efficacious in controlling the cotton boll weevil, thrips and other plant bugs attacking the cotton plant.

**Battle in the Offing**

Heptachlor and chlordane are scheduled to be produced and sold concurrently. The Velsicol organization will utilize its existing sales outlets, both in the U. S. A. and in foreign markets, for the new addition to its line. Correspondingly, it will be marketed to compounders with recommendations for the manufacture of 25% emulsifiable; 50% wettable powder; 1% base oil spray; and 5:5 cotton dust (5% heptachlor, 5% DDT) formulations.

As yet, the precise future of heptachlor—where it will find its optimum field of use—is still a matter for speculation. The outcome will hinge in part on the voracity and susceptibility of miscellaneous bugs and on the competition that heptachlor will experience from its 8-chlorine-atom cousin, chlordane (as well as from other insecticides). They'll be battling each other, of course, for certain markets. And, in addition, with an eye on the lush cotton insecticide field, Velsicol will have to contend with toxaphene, benzene hexachloride and also DDT.

With more than a million pounds of heptachlor scheduled to enter the fray, and with facilities being expanded by both toxaphene and benzene hexachloride makers, there'll be plenty of activity in the field in 1951. Next season, at least, the cotton market will be able to absorb a far greater tonnage of all insecticides than existing facilities will be able to produce. Later, however, supply and demand are destined to come into closer balance. Then the battle lines will be drawn; and presiding as ruling judge as to which toxicant will preempt what, will be the entomologist's yardstick: cost-per-unit-kill.

## FLAVOR FRONT

**Essential oil producers use technology to keep hostilities from cheating palates.**

WAR is hell on a lot of things... spices and essential oils for flavoring included. This was the opinion gained by users of these savory compounds during the conflict that raged not too many years ago. At that time each new enemy thrust knocked another bottle off the industry's global spice shelf.

Small wonder then that industrial users of flavoring materials started to shudder when hostilities broke out in Korea. Buying spurts began and a lot of people rode off in all directions simultaneously while trying to stock up. But as suddenly as it began the spice spree stopped—for the simple reason that no one could decide which spices to hoard. It all depended upon what particular geography might be involved in a future war. Since this is a matter for fates and generals to decide, if they are called upon to make that decision, the eager buyers had to relax and trust to technology to bring out adequate synthetic or imitation flavoring materials if and as needs arose.

Actually this trust is well placed. The essential oil industry is pretty well equipped to handle war-born emergencies. And the trend to the use of the oils or oleoresins derived from spices instead of the whole spices themselves represents a major step of conservation of supplies and resources.

**Double Pepper**

The case of black pepper is a good example of the flavor savings that can be achieved by this practice. About six pounds of the flavor-bearing oleoresin can be solvent-extracted from 100 pounds of the whole spice. Though it's easier to ship and store and a lot more predictable to use than the parent substance, its economic advantage lies in the fact that it gives twice as much flavoring effect. The same six pounds of oleoresin when distributed on a suitable carrier such as dextrose or salt will have the flavoring effect of 200 pounds of the whole pepper. And that's nothing to sneeze at.

The essential oil industry is also better prepared to handle the problems of synthesis of flavoring ingredients than it was in World War II. During that conflict the synthesis know-how was at hand but the industry suffered from the disadvantage of having a low equipment-buying priority. Since the war, however, they have built man-made essential oil plants to take the place of the plants of nature that are trampled by the feet of armies.

In the last war, for instance, Oil of Cassia rose to $14 a pound in this country before it disappeared altogether from the market. The long Japanese occupation of China halted the flow of that big source of cinnamon flavor which contains as its active ingredient a minimum of 85% cinnamic aldehyde.

**Needled Cinnamon**

With the postwar communist swipe of China the same thing happened all over again. The supply is down to a mere trickle which seeps into Hong Kong for export. As a result users are turning toward Ceylon cinnamon, which has a content of approximately 25% cinnamic aldehyde and 75% eugenol. This mixture can be "needled" with synthetic cinnamic aldehyde to the desired flavoring level.

A somewhat similar situation exists with regard to Oil of Coriander, which has a host of flavoring outlets ranging from gin to ground meat products. This delicate-tasting substance comes mainly from the countries behind the iron curtain. And it is doled out to the rest of the world in a manner as unpredictable as Russian diplomacy.

For this reason American essential oil houses are turning out excellent substitutes for Coriander which usually are built around bois de Rose, imported from South America. This material mainly consists of linaloöl and its esters, thus bearing a close chemical resemblance to Coriander.

All of which is another way of saying that technology is breaching the walls of one of the last citadels of wizardry in commerce: the compounding of flavoring ingredients. It's getting so a man can't even believe his own taste buds.

# Evaluation Rules Out Profitless Projects

By C. R. HOWEY, Development Department
Naugatuck Chemicals Division, Elmira, Ont.

**BETTING YOUR MONEY on a dead horse is a proverbial way of losing it, but many chemical projects are as inevitably doomed to failure. Economic yardsticks should be applied with increasing accuracy at successive development stages.**

MANY of us have often wondered why our own companies, or others, have failed to go through with certain projects, and why some were dropped like hot potatoes after only a few laboratory runs had been made. Decisions to drop certain projects hardly before they are started, and to pursue others aggressively, are based on over-all economic surveys—the traffic lights of our capitalistic system. The truth of the matter is that the motivating force of private enterprise is the dollar sign—and the return on our investments.

### FOUR EVALUATIONS

The path of a new chemical from the time of its discovery in the laboratory to full-scale plant production is marked with a number of hurdles, each of them labeled "Economic Evaluation." An evaluation of the new product should be made at four stages, at the least, in its career:

1. After research has discovered the new chemical or a new method of making an old chemical, but *before* further laboratory study by chemical engineers in the process development group.
2. Before pilot-plant trials.
3. Before small-scale production in a semi-works plant.
4. Before deciding to build a new plant or to modify an existing one.

When the research chemist succeeds in synthesizing a new chemical, and has discovered at least one use for it, a preliminary market survey should be made to obtain a reasonable estimate of the potential market. Provided with this information, one or more chemical engineers will sit down and make some calculations, throw in a few reasonable guesses, and ask a lot of questions.

First of all, an estimate of the cost of the new chemical should be made. This is not always easy, since it is difficult to extrapolate the research chemist's process to a production scale. Thus, a hydrolysis step may take one hour in a liter flask, while in a 500-gallon reactor it may require anywhere from one hour to six hours. A reasonably safe rule-of-thumb for most reactions is to use a factor of four.

From the research report it will be possible to obtain a list of raw materials and the amounts required. But research men have an ingrained habit of starting with C.P. chemicals, and we have to guess whether technical raw materials are suitable. Another researchers' custom is to purify their product to the $n^{th}$ degree; here again it is necessary to make a reasonable guess as to the purity required; this will obviously depend on the proposed use.

Estimating the labor cost at this stage is likewise a matter of "experienced guessing." From the research report we can enumerate the number of separate reactions involved as well as the number of associated operations, such as filtration, washing, distillation, drying, grinding, etc. Our market estimate will indicate the plant size required; and by correlating this with the number of operations to be done, we can, from experience, make a tolerable estimate of the labor required.

The next item in our rough cost estimate is the indirect expense, including overhead. We must, after our examination of the research report, visualize a full-grown plant with all its reactors, pumps, filters, piping, recorders—and with the help of the mechanical engineering department, estimate the cost of such a plant. Now we can calculate depreciation charges, based on whatever procedure the accounting

department has set up. A general rule is to depreciate buildings at 5% and equipment at 10%. If special circumstances such as high corrosion rates are involved, we may depreciate the latter at 15% or 20%.

Total capital investment also includes working capital: raw materials, inventory of finished goods, labor and salaries, and credit extended to customers.

Other items of indirect expense include taxes, insurance, roads and yards, repairs and maintenance, watchmen, factory nurse, testing laboratory, foremen's salaries, and the office staff. There are also minor items such as unemployment insurance, vacation pay, and workmen's compensation.

The cost of steam, water, and electric power should not be neglected, but these estimates will be very rough at this stage. When more data are available, they can be adequately calculated.

We now summarize our estimates, and they might look something like this:

| | | | |
|---|---|---|---|
| Potential market | 500,000 lbs. per year | | |
| Capital cost: Bldg. | $40,000 | | |
| Equipment | $200,000 | | |
| Material cost/lb. | | | $0.24 |
| Labor | | | 0.05 |
| Indirect expense: | Depreciation | | 0.044 |
| | Other | | 0.04 |
| | | | $0.374 |

This cost represents the bulk cost of the material before it is packaged and turned over to the warehouse to be sold. Cost of packaging will vary all over the lot, depending on whether we use multi-wall bags, or lever-packs, or metal containers, etc. We will assume here a cost of 0.005 per lb. Our packaged cost is now 0.374 + 0.005, or $0.379.

There are additional costs even after the material is made and packaged. It costs money to send salesmen out on the road; advertising, too, costs money. In addition, research and development departments are certainly not self-supporting; they have to be maintained by our earnings. Finally, we must remember that the president, the board of directors, and other company officers have to be paid out of earnings, along with other administrative expenses such as legal fees, and auditors. These may run from 10 to 15% of the packaged cost of product. At 10% this amounts to 0.038, giving us a total cost of 0.379 + 0.038, or 0.417—about 42¢.

## POSSIBLE PRICE LEVEL

While all this has been going on, the sales department or market research department will have been finding out what competitive materials are on the market, and be prepared to tell us what the potential customer might be willing to pay for the new product. If there is no competitive or similar material on the market, we may have to set a selling price by calculating what level is necessary to give a satisfactory return on the total capital investment. Let us assume that in this particular case it is 60¢. This gives us a potential profit of 18¢ per lb. or $90,000 per year. This looks good, since the estimated capital expenditure of $240,000 can be repaid from profits in three years.

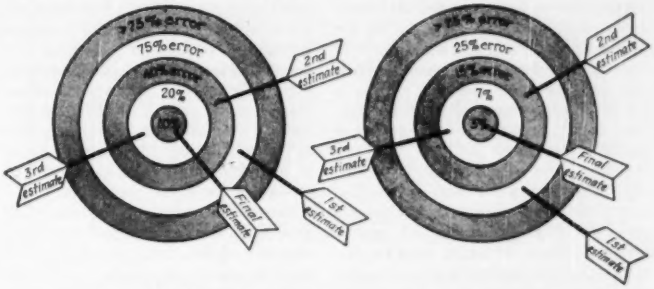
As a general rule, in the organic chemical industry, a project is expected to repay the capital expenditure in from 3 to 5 years. It is just plain good business to expect to get back the money you've sunk into a venture in a reasonable time. Then too, the peak popularity of many chemicals is only a few years; this is particularly true of pharmaceuticals and to a certain extent of agricultural chemicals.

Now it should be made clear to management that the above estimates are very, very preliminary; we frequently refer to them as "guesstimates." If the evaluation at this stage shows even a small profit, it is probable that management will authorize further laboratory work by chemical engineers in the process development group. By virtue of their training and experience, these men are qualified to work on the practical aspects of the process. Not only are they interested in high yields and short reaction cycles, but also such items as materials of construction, steam, water, and electric power requirements, and packaging problems.

After a few weeks or months of laboratory work, the economic study is repeated with the benefit of new data. It is to be expected that the process development group will have been able to improve the original process, or introduce short cuts, to reduce material and labor costs. On the other hand, they may have found that more equipment is required, or that equipment of special design or of special materials is necessary, which will increase the estimated capital outlay.

Consideration should also be given to the general design of the plant and equipment—whether the equipment is very specialized, or whether it could be adapted to other processes. Thus, it may be expedient to run a plant for 6 months on one product, and 6 months on another. Likewise, if for some reason we should suddenly stop manufacture of the new chemical, it is very nice to be able to use the equipment for other purposes rather than have it rust away in idleness.

Meanwhile, the marketing or sales group will have more to report. The size of the potential market may be revised, and we should know how many potential customers we have. It is dangerous to put all your eggs in one basket, and it's just as risky to produce a chemical for only one or two customers who may suddenly decide that they no longer need our product or may find some other product more suitable.




**BULL'S-EYE ACCURACY** on final estimate insures profits, prevents costly mistakes.

The location of the potential market is also important. It is obvious that a manufacturer in Nova Scotia should think twice about producing a flotation agent for the zinc ores in British Columbia. Nevertheless, if the dollar value of the product and the potential sales volume are sufficiently large, we may be justified in considering these far-away markets.

## PILOT PLANT NEXT

The second round table conference will re-examine the profit picture and consider the available information on plant design, size and location of markets, and a decision will be reached on whether pilot-plant trials are justified.

Pilot-plant trials may involve batches of only a few pounds or hundreds of pounds, depending on the value of the product and the size of the vessels available in the pilot plant. These pilot-plant operations serve as a check on the information obtained in the lab and also as a means of discovering operating difficulties which failed to show up, or were not recognized. Yields and cycles are always different with larger batch sizes; adequate data on require-

(*Turn to page 742*)

# Chemical Growth Outruns Economic Trends

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**CHEMICAL INVESTMENTS are highly prized—for the good reason that this dynamic industry has outpaced the growth of population, the number of automobiles and even the national income.**

THE primary purpose of corporations in the chemical industry, as in other industries in the free enterprise half of the world, is to make money. Therefore, the basic problem of the top management of any chemical corporation is how to make the maximum profit on capital invested in the production and sale of chemicals. It is not too difficult to find chemicals, either old ones or new ones, on which a profit of some magnitude can be realized on an investment—at least in a period of medium to high level of business. The big problem is to decide which of a number of possible chemicals will yield the maximum profit on a given amount of capital invested. Such decisions involve the application of a complex mass of economic and technical data and principles—which may be called "chemical economics." My own definition is that "chemical economics is the application of the law of supply and demand plus a broad knowledge of raw materials, processes, products and markets to making intelligent and profitable decisions in chemical industry."

## CHEMICAL INDUSTRY IS DYNAMIC

The chemical industry has for the past 25 years been a favorite of investors, both by large investors of venture capital and by small investors in a few shares of stock. The basic reason for this favored position of chemical securities is that the chemical industry has proved itself to be one of the most dynamic of all industries. In fact, the chemical industry has shown the highest growth rate over the past 25 years of any major segment of the United States economy. During these 25 years, and particularly during the past 10 years, the chemical industry has emerged from the status of a fringe industry furnishing raw materials to other industries into full-fledged status as a major basic industry. The sales volume of the chemical industry has increased from about $600 million in 1925 to the $5.5 billion level in 1948 and 1949. In these last two years this has amounted to about 2% of the gross national product.

Figure 1 compares the rate of growth of the chemical industry with the rate of growth of all U. S. Industry as measured by the Federal Reserve Board Index of Industrial Production and with the rate of growth of the population of the United States. The curve showing production of chemicals is a new Index of Chemical Production recently developed at Stanford Research Institute which will be discussed more fully later in this paper. The average rate of growth of chemical production over the past 25 years is seen to be over 3 times the average of all U. S. industry and 11 times the rate of growth of the U. S. population.

Figure 2 compares the rates of growth of the organic and inorganic segments of the chemical industry. All the data shown in Figure 2 are production indexes with 1935-39 = 100. The organic part of the chemical industry shows a growth rate nearly twice that of the inorganic part. Figure 3 shows data on the dollar value of sales of the chemical industry (in terms of current dollars for each year), which have been computed from the chemical production indexes by means of the 1947 Census of Manufactures combines with the wholesale price index for chemicals. The methods used will be discussed later in this article. The dollar values of sales shown in Figure 3 agree quite well with sales data taken directly from the Census of Manufactures for census years in the period 1925-39.

The rapid growth rate of the chemical industry during the past 25 years indicates that the industry has been, and still is, in a youthful phase. This high percentage rate of growth can conceivably continue for several decades yet, but eventually it will undoubtedly diminish its precipitous rate of growth as it approaches "maturity," just as the steel, petroleum, automobile, coal and other industries have in the past.

By way of orientation for the reader at this point, Tables I and II are presented, showing the production magnitudes of major inorganic chemicals and organic chemicals, respectively. These tables are all-inclusive and are believed to include all inorganic chemicals down to 50,000 tons (100,000,000 lbs.) per year and all organic chemicals down to 50,000,000 lbs. per year in 1949. In addition to inorganic chemicals per se, Table I includes also non-metallic elements (carbon, sulfur, chlorine, oxygen, hydrogen, phosphorus) and a few minerals which are mined as substantially pure chemical compounds (salt, gypsum, barite, borax, fluorspar).

## S. R. I. INDEX OF CHEMICAL PRODUCTION

The Index of Chemical Production shown in Figures 1 and 2 was developed at Stanford Research Institute for use as a bench mark in chemical economic studies since no index of

**TABLE I—PRODUCTION OF MAJOR INORGANIC CHEMICALS—1949**

(in order of 1949 production)

| | *Thousands of Short Tons* |
|---|---|
| 1. Carbon | 65,354 |
| 2. Sodium chloride | 15,590 |
| 3. Sulfuric acid | 10,737 |
| 4. Calcium oxide* | 6,820 |
| 5. Calcium sulfate | 6,492 |
| 6. Sulfur | 5,400 |
| 7. Sodium carbonate | 4,119 |
| 8. Monobasic calcium phosphate | 3,126 |
| 9. Sodium hydroxide | 2,694 |
| 10. Chlorine | 1,767 |
| 11. Ammonium sulfate | 1,604 |
| 12. Potassium chloride | 1,535 |
| 13. Ammonia | 1,506 |
| 14. Alumina* | 1,280 |
| 15. Nitric acid | 1,129 |
| 16. Ammonium nitrate | 1,019 |
| 17. Barium sulfate | 731 |
| 18. Phosphoric acid | 697 |
| 19. Oxygen | 602 |
| 20. Aluminum sulfate* | 596 |
| 21. Carbon dioxide | 552 |
| 22. Calcium chloride* | 550 |
| 23. Sodium sulfate | 537 |
| 24. Hydrochloric acid | 494 |
| 25. Calcium carbide | 460 |
| 26. Sodium tetraborate* | 451 |
| 27. Sodium silicate | 446 |
| 28. Magnesium oxide* | 363 |
| 29. Titanium dioxide | 279 |
| 30. Calcium fluoride | 237 |
| 31. Potassium sulfate | 194 |
| 32. Calcium carbonate | 187 |
| 33. Carbon disulfide | 183 |
| 34. Sodium bicarbonate | 153 |
| 35. Dibasic sodium phosphate | 131 |
| 36. Phosphorus | 124 |
| 37. Lead monoxide | 118 |
| 38. Zinc oxide | 111 |
| 39. Copper sulfate | 97 |
| 40. Dibasic calcium phosphate | 88 |
| 41. Tetrasodium pyrophosphate | 78 |
| 42. Sodium chromate and bichromate | 76 |
| 43. Hydrogen | 71 |
| 44. Tribasic sodium phosphate | 70 |
| 45. Magnesium carbonate* | 61 |
| 46. Potassium hydroxide* | 54 |

1. Asterisks indicate 1948 data.
2. List includes non-metallic elements and minerals which are mined as substantially pure chemical compounds.
3. List does not include certain intermediates such as nitrogen, sulfur dioxide, sulfur trioxide and phosphorus pentoxide.
4. Data are on 100% basis wherever possible, except that hydrates are given in hydrated form.
5. All data are from U. S. Government sources, except phosphorus which was estimated from phosphoric acid and minor uses.

this sort was available from the usual government sources, except the Federal Reserve Board Index of Industrial Chemicals Production which goes back only to 1939. The basis of the Federal Reserve Board Index is such that it is impossible to extend it back before 1939. Table IV gives the numerical values of the chemical production indexes which are shown plotted in Figure 2.

The Index of Chemical Production developed at Stanford Research Institute is based upon the sums of the production of all organic chemicals over 50,000,000 lbs. per year and all inorganic chemicals over 100,000 tons per

**TABLE II—PRODUCTION OF MAJOR ORGANIC CHEMICALS—1949**

(in order of 1949 production)

| | Millions of Pounds |
|---|---|
| 1. (Ethylene) | 1,280 |
| 2. Benzene | 1,151* |
| 3. Ethyl alcohol | 1,056* |
| 4. Methanol | 852* |
| 5. Cellulose, regenerated | 850 |
| 6. (n-Butylenes) | 750 |
| 7. (Propylene) | 740 |
| 8. Isopropyl alcohol | 688* |
| 9. Acetic anhydride | 652* |
| 10. Toluene | 593* |
| 11. (Acetaldehyde) | 500 |
| 12. (Ethylene chlorohydrin) | 500 |
| 13. (Butadiene) | 494* |
| 14. Ethylene glycol | 440* |
| 15. Xylenes | 417* |
| 16. Acetone | 413* |
| 17. (Ethyl benzene) | 411* |
| 18. (Ethylene oxide) | 400 |
| 19. Styrene | 390* |
| 20. Acetic acid | 370* |
| 21. Carbon disulfide | 367* |
| 22. Cellulose acetate | 366* |
| 23. (Acetylene) | 345* |
| 24. (Tetrachloroethane) | 320 |
| 25. (Ethyl chloride) | 307* |
| 26. Tetraethyl lead | 275 |
| 27. (Chlorobenzene) | 252* |
| 28. Ethylene dichloride | 246* |
| 29. Trichloroethylene | 240 |
| 30. Naphthalene | 235* |
| 31. Vinyl chloride | 230 |
| 32. Phenol | 225* |
| 33. Formaldehyde | 203* |
| 34. (Aldol) | 200 |
| 35. Carbon tetrachloride | 197* |
| 36. Glycerol | 194* |
| 37. Na dodecyl benz. sulfonate | 180 |
| 38. Urea* | 168 |
| 39. (Crotonaldehyde) | 150 |
| 40. Phthalic anhydride | 150* |
| 41. (Secondary butyl alcohol) | 150 |
| 42. (Dodecyl benzene) | 140 |
| 43. (Diacetone alcohol) | 130 |
| 44. Nitroglycerine | 130* |
| 45. (Adipic acid) | 125 |
| 46. (Ketene) | 125 |
| 47. n-Butyl alcohol | 120* |
| 48. (Cyclohexane) | 120 |
| 49. Methyl ethyl ketone | 120 |
| 50. (Isobutylene) | 120 |
| 51. Perchloroethylene | 100 |
| 52. Ethylene dibromide | 95* |
| 53. (Pentachloroethane) | 95 |
| 54. Propylene glycol | 85* |
| 55. (Butyraldehyde) | 55 |
| 56. Cellulose nitrate | 76* |
| 57. Aniline | 72* |
| 58. Chloroprene | 71 |
| 59. Oleic acid | 70 |
| 60. Ethyl acetate | 68* |
| 61. Dichlorodifluoromethane | 65 |
| 62. (Nitrobenzene) | 65* |
| 63. Stearic acid | 60 |
| 64. n-Butyl acetate | 55* |
| 65. Furfural | 55 |
| 66. Di-2-ethylhexyl phthalate | 51* |
| 67. (Hexamethylenediamine) | 50 |

1. Data are on 100% basis wherever possible.
2. Asterisks indicate data are from U. S. Government sources; others are estimated by various methods.
3. Chemicals in parentheses are largely used as intermediates in same plant where produced and therefore are not articles of commerce to a major extent.

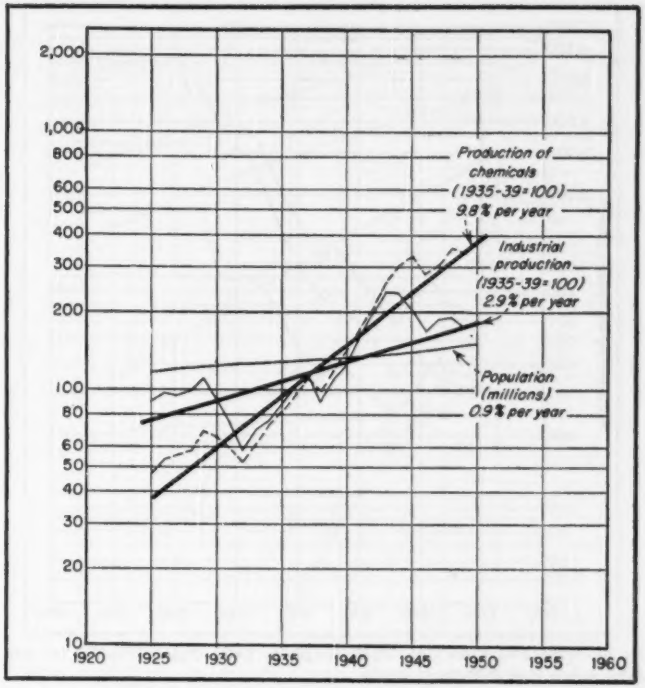



Fig. 1—CHEMICAL PRODUCTION outstrips industrial production, population.

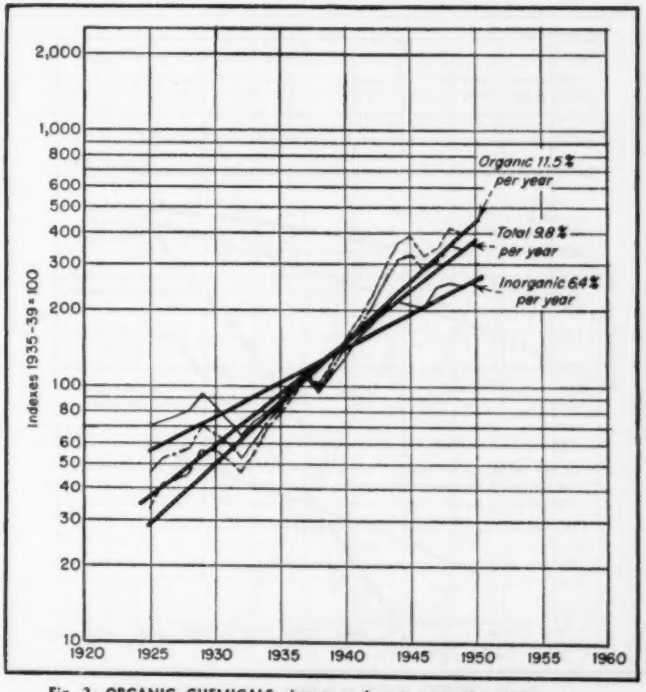



Fig. 2—ORGANIC CHEMICALS show growth rate twice that of inorganics.

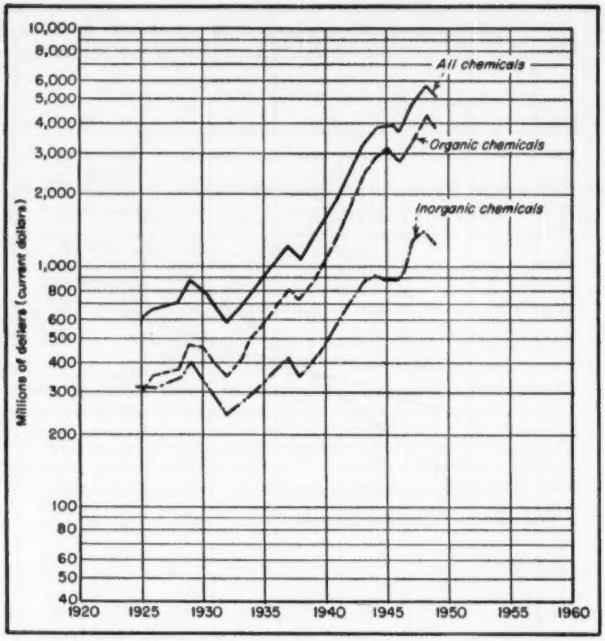



Fig. 3—INDUSTRIAL CHEMICAL SALES continue to climb. Organic sales lead but inorganics reflect same influences of growth.

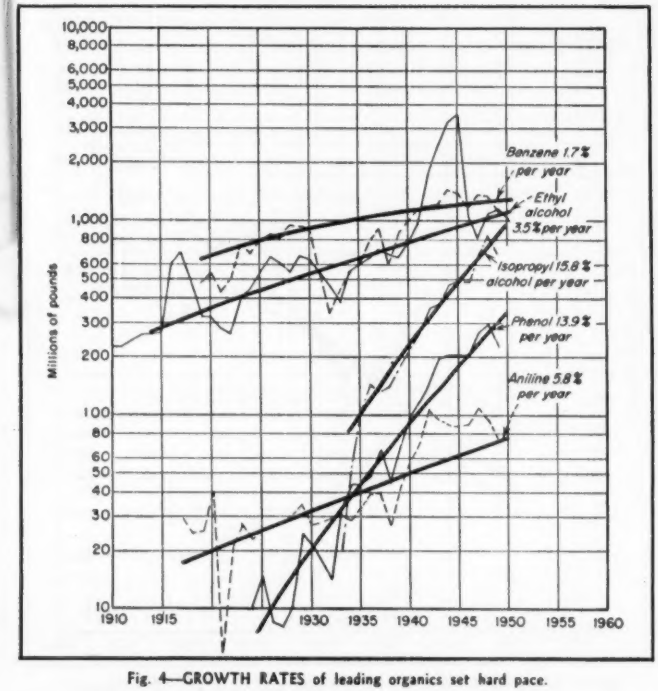



Fig. 4—GROWTH RATES of leading organics set hard pace.

year. The organic and inorganic indexes were computed separately and then combined by a method to be described later to give the combined Index of Chemical Production for all chemicals.

The list of organic chemicals includes all organic chemicals over 50,000,000 lbs. per year after eliminating all chemicals which involve overlapping. For instance, the list includes isopropyl alcohol but not acetone, since acetone is largely made from isopropyl alcohol. Similarly the list includes ethyl alcohol but not acetic acid, phthalic anhydride but not naphthalene, tetraethyl lead but not ethyl chloride, phenol, aniline, styrene, nylon, DDT and BHC, but not benzene, etc. However, the list still includes a few partial overlaps for instance, ethyl alcohol and cellulose acetate, ethyl alcohol and normal butyl alcohol, methanol and ethylene glycol, and a few others, but these overlaps involve less than 50% of the production of each chemical concerned in all cases. The only important omissions from the list are fermentation butyl alcohol, formaldehyde and acetaldehyde from hydrocarbon oxidation, and lauric, oleic and stearic acids, on which no data are available, but these omissions would have little, if any, effect on the overall organic chemical index.

The organic chemical production index was computed by adding the productions of these 28 organic chemicals for each year and then reducing to an index basis where 1935-39 = 100. In the addition, organic chemicals selling for less than 8¢ per lb. at the present time were given a weight of ½, namely, ethyl alcohol, methanol, isopropyl alcohol, butadiene, urea and carbon tetrachloride. Ideally each chemical should be weighted by its relative price each year, but that would involve so much

TABLE III—CHEMICAL PRODUCTION INDEXES

(1935-39 = 100)

| | *Organic Chemicals* | *Inorganic Chemicals* | *All Chemicals* |
|---|---|---|---|
| 1925 | 33.9 | 68.8 | 45.8 |
| 1926 | 41.7 | 71.3 | 51.8 |
| 1927 | 43.2 | 75.1 | 54.0 |
| 1928 | 45.0 | 79.8 | 56.9 |
| 1929 | 56.6 | 93.1 | 69.0 |
| 1930 | 55.8 | 82.6 | 64.9 |
| 1931 | 51.5 | 72.7 | 58.7 |
| 1932 | 46.2 | 63.0 | 51.9 |
| 1933 | 54.2 | 71.9 | 60.2 |
| 1934 | 68.2 | 78.8 | 71.9 |
| 1935 | 78.2 | 86.1 | 80.9 |
| 1936 | 91.6 | 99.6 | 94.3 |
| 1937 | 109.2 | 108.7 | 109.0 |
| 1938 | 99.7 | 94.8 | 98.1 |
| 1939 | 121.2 | 110.8 | 117.7 |
| 1940 | 150.1 | 127.9 | 142.6 |
| 1941 | 179.5 | 155.1 | 171.2 |
| 1942 | 218.0 | 173.4 | 202.9 |
| 1943 | 288.0 | 202.7 | 259.1 |
| 1944 | 354.4 | 220.4 | 308.9 |
| 1945 | 384.4 | 212.0 | 325.9 |
| 1946 | 327.1 | 206.4 | 286.0 |
| 1947 | 343.3 | 248.2 | 311.1 |
| 1948 | 405.4 | 257.1 | 355.1 |
| 1949 | 399.5 | 252.9 | 349.8 |

labor that the rough method of weighting just described was adopted. This method prevents the large production cheap chemicals from weighting the index too heavily. The justification for this weighting rests on the assumption that higher-priced chemicals require more plant investment and manpower per ton of production than do lower-priced chemicals.

The list of inorganic chemicals includes all inorganic chemicals over 100,000 tons per year after eliminating all chemicals which involve overlapping. For instance, the list includes soda ash but not sodium bicarbonate nor lime-soda process caustic soda, phosphoric acid but not sodium phosphates, sulfuric acid but not sodium sulfate nor aluminum sulfate, ammonia but not nitric acid, etc. In the addition, chemicals selling for less than 1.5¢ per lb. (sulfuric acid, soda ash, hydrochloric acid) were given a weight of ¼ and chemicals selling for 1.5¢ to 3¢ per lb. (chlorine, caustic soda, sodium silicate) were given a weight of ½, for reasons discussed in the last paragraph.

The organic and inorganic chemical production indexes were combined to give an index of total chemical production on the basis of sales of chemicals given in the 1947 Census of manufactures. Table V shows the sales of organic and inorganic chemicals in 1947 as compiled from the Census of Manufactures. The 1947 Census of Manufactures is the first in which sufficiently complete data are given to make it possible to determine overall figures for the sales of organic and inorganic chemicals. The items in Table V were selected from the 1947

**TABLE IV—CHEMICALS INCLUDED IN PRODUCTION INDEXES**

| *Organic Chemicals (28)* | *Inorganic Chemicals (13)* |
|---|---|
| Aniline | Ammonia |
| Benzene hexachloride | *Chlorine |
| *Butadiene (from petroleum only) | **Hydrochloric acid |
| Butyl alcohols (total) | Litharge |
| Butyl rubber | Lithopone |
| *Carbon tetrachloride | Oxygen |
| Cellulose, regenerated | Phosphoric acid |
| Cellulose acetate | **Sodium carbonate |
| Cellulose nitrate | *Sodium hydroxide (electrolytic only) |
| DDT | *Sodium silicate |
| *Ethyl alcohol | **Sulfuric acid |
| Ethylene dibromide | Titanium dioxide |
| Ethylene glycol | Zinc oxide |
| Glycerine | |
| *Isopropyl alcohol | |
| *Methanol | |
| Neoprene | |
| Nylon | |
| Perchloroethylene | |
| Phenol | |
| Phthalic anhydride | |
| Polyethylene | |
| Styrene | |
| Surface active agents (total) | |
| Tetraethyl lead | |
| Trichloroethylene | |
| *Urea | |
| Vinyl plastics (total) | |

* Chemicals given weight of ½ (organics < 8¢/lb.; inorganics 1.5 to 3¢/lb.).
** Chemicals given weight of ¼ (inorganics <1.5¢/lb.).

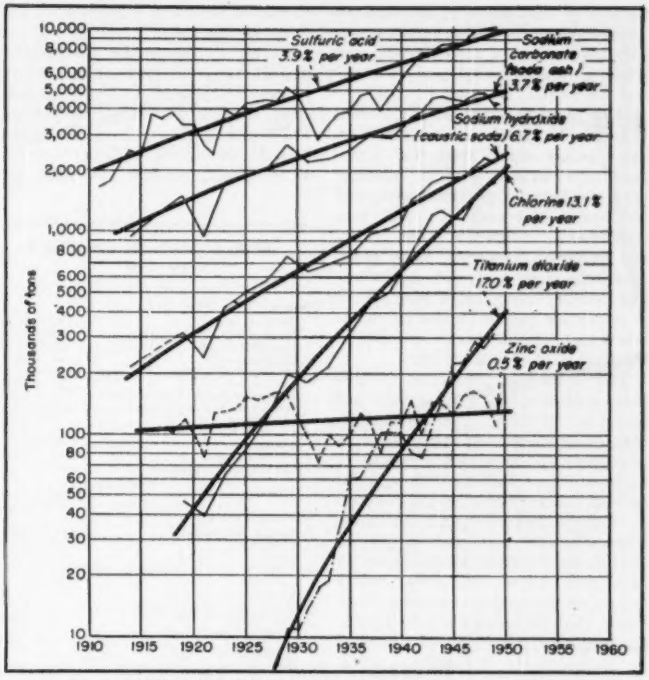



Fig. 5—OUTPUT OF INORGANICS also boosts total of whole industry.

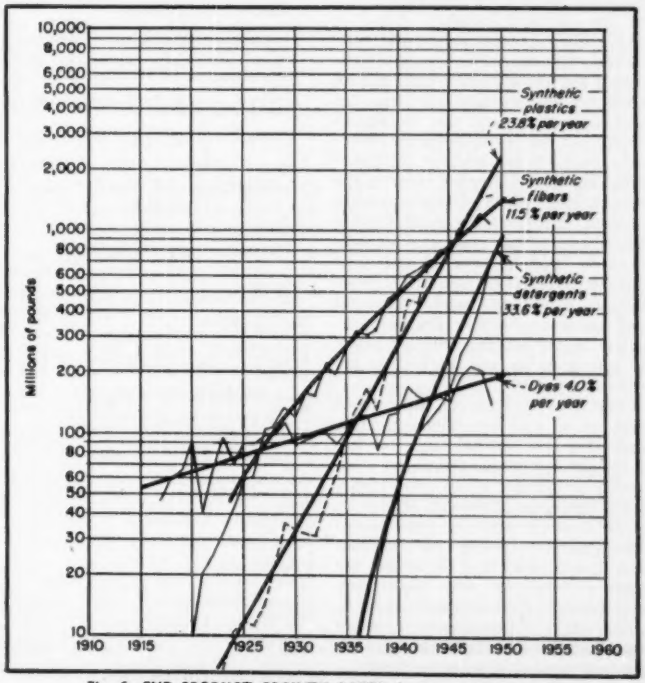



Fig. 6—END PRODUCT GROWTH RATES show very steep ascent.

Census of Manufactures in order to give as complete and accurate a picture as possible of the inorganic and organic chemical branches of the chemical industry. The items in Table V include all items listed under Chemical Industry in the Census of Manufactures except crudes from coal, petroleum and natural gas. In addition, there are included pigments, medicinal chemicals, sulfonated oils and fats, compressed and liquefied gases, glycerin, synthetic detergents, fatty acids, chemicals from hardwood distillation, and destructively distilled pine oil, all of which are included under industries other than the Chemical Industry in the Census of Manufactures.

The respective production indexes were applied to the 1947 organic and inorganic chemical sales volumes to obtain computed dollar values for sales of organic and inorganic chemicals in each year from 1925 to 1949 in terms of 1947 dollars. Then the dollar values of organic and inorganic chemicals were added for each year to get the total dollar value of all chemicals in each year. These total dollar values were then reduced to an index basis where 1935-39 average = 100. This is the origin of the Index of Chemical Production shown in Figures 1 and 2.

## COMPARATIVE GROWTH RATES

Not all chemicals have shared to the same extent in the high growth rate of the chemical industry. Figure 4 shows the comparative growth rates of some representative organic chemicals. These growth rates, ranging from 1.7% per year to 15.8% per year, are to be compared with the average of 11.5% per year for all organic chemicals and 9.8% per year for all chemicals. The big difference between the growth rates of ethyl and isopropyl alcohols illustrates the great inroads that isopropyl has made into markets formerly held by ethyl alcohol. The big difference in growth rate between benzene on the one hand and phenol and aniline on the other illustrates the origin of the benzene shortage which is now upon us and destined to get still more severe.

The general form of such trend lines on a semi-logarithmic chart is that they are curved and concave down. In a youthful phase any commodity or industry grows very rapidly, but as time goes on the rate of growth, in terms of per cent per year, diminishes gradually, giving rise to a concave down trend line. However, the curvature may be very slight even over periods of 20 or more years. In a later stage of development the trend lines become practically straight but may still have a slope many times the population growth slope. Many of the chemicals shown in Figures 4, 5, and 6 are in this stage.

Figure 5 shows the comparative growth rates of some representative inorganic chemicals. These growth rates, ranging from 0.5% per year to 19.7% per year, are to be compared with the average of 6.4% per year for all inorganic chemicals and 9.8% per year for all chemicals. The high growth rate of chlorine reflects its large use in organic chemical production. The marked difference in growth rate of chlorine and sodium hydroxide reflects the diminishing importance of the lime-soda process and the increasing production of chlorine in conjunction with the production of metallic sodium. Titanium dioxide is the pacesetter among inorganic pigments, one of the most important classes of inorganic chemicals.

Figure 6 shows the comparative growth rates of some end-chemical groups. Synthetic plastics, synthetic detergents and synthetic fibers are among the fastest growing end chemical groups; and the first two have growth rates far above the average of all organic chemicals. Dyes are slow-moving by comparison, but still have a growth rate higher than the average of all U. S. industry. Some other end chemical groups, such as fertilizers, insecticides, pigments, and solvents have quite respectable growth rates, but lower than the three fast-movers shown in Figure 6.

Table VI compares the growth rates of a number of major chemicals, both organic and inorganic. Most of the growth rates are averages covering 20 to 40 year time-spans, although a few cover time-spans of only 4 to 10 years. The growth rates shown in Table VI cover a very wide range—from 0.4% per year for rosin up to 82% per year for penicillin. A comparison of Table I with Table VI shows clearly the high growth rate of the chemical industry and many of the major chemicals in comparison with major industries such as petroleum, energy, automobiles, steel, cotton, coal, copper and lumber.

**TABLE V—SALES OF CHEMICALS IN 1947[1]**

| | |
|---|---|
| *Organic Chemicals*[2] | |
| Synthetic fibers | $704 million |
| Synthetic plastics and resins | 530 million |
| Synthetic rubber | 254 million |
| Synthetic dyes | 149 million |
| Medicinal chemicals | 145 million |
| Synthetic detergents | 135 million |
| Explosives (except black powder) | 83 million |
| Rubber processing chemicals | 43 million |
| Plasticizers | 41 million |
| Pigments (lakes and toners) | 38 million |
| Flavor and perfume chemicals | 23 million |
| Sulfonated oils and fats | 17 million |
| Other organic chemicals[3] | 1,271 million |
| Total | $3,433 million |
| *Inorganic Chemicals* | |
| Sodium compounds | $285 million |
| Pigments | 263 million |
| Acids | 124 million |
| Ammonia and ammonium compounds | 92 million |
| Aluminum compounds | 77 million |
| Compressed and liquefied gases[4] | 71 million |
| Calcium compounds | 51 million |
| Potassium compounds | 37 million |
| Chlorine | 31 million |
| Black Powder | 3 million |
| Other inorganic chemicals[5] | 243 million |
| Total | $1,277 million |
| *Total, All Chemicals* | $4,710 million |

[1] From Census of Manufactures, 1947.
[2] Does not include "crudes" from coal, petroleum and natural gas, naval stores, textile assistants (other than sulfonated oils).
[3] Includes cyclic and acyclic intermediates, cyclic and acyclic end-chemicals, ethyl alcohol, glycerin, fatty acids, acetylene, chemicals from hardwood distillation, destructively distilled pine oil, etc.
[4] Except acetylene.
[5] Includes all inorganic chemicals not included under previous headings.

**TABLE VI—GROWTH RATES OF SELECTED CHEMICALS AND END-CHEMICAL GROUPS**

| | *Average Per Cent Per Year Rate of Growth* | *Period Covered* |
|---|---|---|
| Penicillin | 82.0 | 1946-49 |
| Synthetic detergents | 33.6 | 1939-49 |
| Plastics | 23.8 | 1925-49 |
| Titanium dioxide | 17.0 | 1935-49 |
| Phthalic anhydride | 15.8 | 1929-49 |
| Isopropyl alcohol | 15.8 | 1936-49 |
| Phenol | 13.9 | 1929-49 |
| Chlorine | 13.1 | 1929-49 |
| *Organic Chemicals* | 11.5 | 1925-49 |
| Rayon | 10.9 | 1929-49 |
| ALL CHEMICALS | 9.8 | 1925-49 |
| Aspirin | 9.0 | 1917-49 |
| Caustic soda | 6.7 | 1919-49 |
| *Inorganic Chemicals* | 6.4 | 1925-49 |
| Aniline | 5.8 | 1917-49 |
| Dyes | 4.0 | 1917-49 |
| Sulfuric acid | 3.9 | 1913-49 |
| Soda ash | 3.7 | 1919-49 |
| Ethyl alcohol | 3.5 | 1910-49 |
| *National Income** | 3.2 | 1910-49 |
| Salt | 3.1 | 1910-49 |
| *Industrial Production* | 2.9 | 1910-49 |
| Benzene | 1.7 | 1920-49 |
| *Population* | 0.9 | 1920-49 |
| Rosin | 0.4 | 1910-49 |

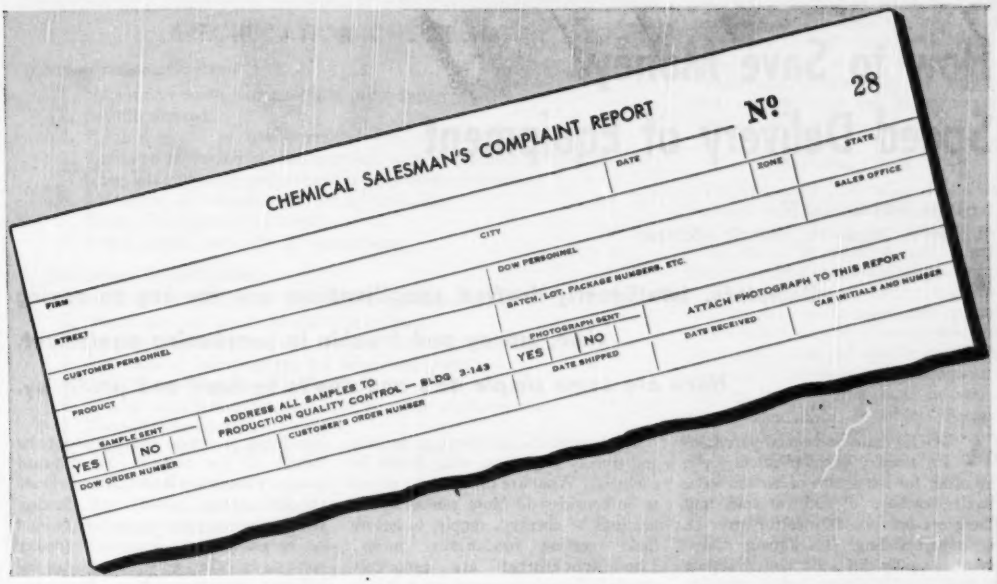
* In terms of standardized dollars.

## COMPETITION THEME OF CHEMICAL INDUSTRY

The chemical industry is subject to intense competition and the production of a profit in the industry is subject to many pitfalls. The interaction of competitive raw materials, processes and products is complex in the extreme. There is a continual state of flux and shifting of the balance among these competitive forces, so that eternal vigilance is the *sine qua non* of continuing to make a profit—probably to a greater extent than is true in any other major industry. Some of the principal types of competitions in the chemical industry may be classified as follows:

1. Competition among processes to produce same product from same raw material.
   (a) Ethylene glycol from ethylene by way of direct oxidation and hydration or by way of

(*Turn to page 743*)


CHEMICAL SALESMAN'S COMPLAINT REPORT No. 28
FIRM
DATE
ZONE
STATE
CITY
SALES OFFICE
STREET
DOW PERSONNEL
CUSTOMER PERSONNEL
BATCH, LOT, PACKAGE NUMBERS, ETC.
ATTACH PHOTOGRAPH TO THIS REPORT
PHOTOGRAPH SENT
YES NO
CAR INITIALS AND NUMBER
DATE RECEIVED
PRODUCT
ADDRESS ALL SAMPLES TO PRODUCTION QUALITY CONTROL — BLDG 2-143
DATE SHIPPED
SAMPLE SENT
YES NO
CUSTOMER'S ORDER NUMBER
DOW ORDER NUMBER

# How Dow Handles Complaints

by HOWARD C. E. JOHNSON, Managing Editor

**A SMALL COMPANY CAN HANDLE COMPLAINTS without a great deal of formal routine. But a large organization with scattered locations and many products—like The Dow Chemical Co.—has to establish a system that will work quickly, build good will, and create better understanding.**

"SWEET are the uses of adversity" might have been written by a Complaint Coordinator — if Shakespeare hadn't beaten him to it. For paradoxically, customers' complaints are opportunities for building good will, improving processing and handling operations, creating new or improved products, or providing valuable technical service to one's customers.

How much good can be wrung out of evil depends, of course, on how expeditiously and intelligently the complaint is handled. Here's where the small organization, because it's more flexible, can often run rings around its larger, slower competitor—one reason the small independent grocer hasn't been bulldozed out of the way by the supermarket.

A large chemical company, whose salesmen and sales offices and plants are scattered from coast to coast, can neither literally nor figuratively sit around a cracker barrel with its customers and adjust complaints on the spot. It must adopt a formalized system—a routine that's as swift and sure and foolproof as one can make it. That's what The Dow Chemical Co. has done; and while the technique is designed for a large organization, the principles apply to complaint handling by any company, large or small.

### SALESMAN BEARS BRUNT

Dow's system is set up on the assumption that the complaint will be transmitted through the salesman, for it is to him, making his scheduled rounds, that the customer is most likely to unburden himself. Therefore the salesman is provided with a pad of forms (*see illustration*) on which he identifies himself, the customer and the product. The product is further identified by batch number, lot, order numbers, dates shipped and received, or whatever data will enable the company to trace the material. If the complaint involves failure to meet product specifications, a sample of the defective material is forwarded to Product Quality Control. On complaints of damage to packages, etc., photographs are taken and attached to the report. The original report goes to the Complaint Coordinator and a copy is retained by the salesman or his sales office. The reports are pre-numbered, and the number serves to identify the complaint in all subsequent correspondence.

The salesmen, incidentally, report all types of customers' complaints, without exception: defective material, faulty packaging, mislabeling, short weight, damage from improper conditions during shipment, error in shipment, and failure to give notification of delay in shipment.

### COORDINATOR KEEPS TRACK

The whole purpose of the procedure is to make certain that all complaints are recorded and tabulated to provide a performance pattern, and to make sure that every case receives prompt action. Responsibility for these objectives is given to the Complaint Coordinator, attached to the Sales Department. He initiates the inquiry as soon

(*Turn to page 828*)

# How to Save Money, Speed Delivery of Equipment

by WILLIAM W. DaLEE
William A. DaLee, Inc., Detroit, Michigan

***Complete, intelligently-drafted specifications are the key to saving time, money and trouble in purchasing equipment. Here are some simple do's and don'ts to heed and profit by.***

A GOOD MANY industrial purchases are simple, uncomplicated. Issue an order for ten drums of caustic soda, twelve carboys of sulfuric acid, and there are few possibilities for error or misunderstanding. But buying equipment is vastly different. Unless it is a simple, standard item, such as an electric motor, the needs of the purchaser must be clearly defined; a detailed, understandable outline must be prepared; in essence, a specification.

Specifications can fulfill their primary purpose, to state the needs and preferences of the purchaser in terms understandable to the seller, only if they are carefully drafted. Too frequently, they are regarded as an unnecessary nuisance and are issued hurriedly without proper thought. This latter procedure is the antithesis of sound business; it results in lost time, money, and efficiency. The good specification, containing the requisite amount of necessary information and devoid of extraneous data, prevents these losses. It facilitates negotiations between both purchaser and seller, ensures that the best piece of equipment is placed in the right job.

This discussion is concerned with the approach and technique to be used in issuing informal inquiries and in soliciting quotations.

Every specification, no matter in what form, is the basis of an order. Every order is a legal, binding contract. In the light of these facts, it is unfortunate that most order-issuing purchasing departments have few, if any, trained engineers on their staffs. As a consequence, the primary responsibility for specification preparation must fall upon the design engineer, operating engineer or plant manager. If he should be ambiguous or careless in his instructions to the purchasing department, the company can incur many serious legal and economic obligations.

What should a specification include, and equally important, what should be excluded? What are the cardinal points to be considered? How can all specifications be checked, simply, to ensure their meeting fundamental needs? Two procedures are commonly adapted: Some companies use a standard form of specification to prevent the omission of important data. Others prefer a standard check list (*see box*).

## CAPITALIZE ON COOPERATION

The basic reason for buying equipment, and installing it in a plant, is to realize a given result: to pump liquids, mix slurries, screen solids, etc. The specifier is familiar with the result he wants to accomplish: the gallons per minute of liquid to be pumped, the distance it must travel, the temperatures to be employed. The *process*, and its characteristics, are his province. The equipment manufacturer, on the other hand, may well be relatively unfamiliar with the *process* and the products to be handled, but he can deal authoritatively with the *performance* data on the *operation* involved.

Thus, the equipment seller is usually placed in the position of an equipment consultant. He must have the basic process requirements to make an intelligent recommendation. If such data are not included in a specification, that is if the processor decides to develop his own equipment design, he should be cognizant of the cost that his decision may involve.

For example, a short time ago a large process company contemplated expanding production facilities to make a new product, a product just developed by research and briefly piloted. A number of agitator vessels were required for the new installation.

The company was determined to keep costs at a minimum, to purchase equipment locally from as few sources as possible, and, to prevent information leaks, to reveal nothing about the nature of the process. No physical property measurements had been made on the various liquids and slurries, which, the company recognized, would be essential if an equipment maker were to be called upon to make an intelligent recommendation. The purchaser decided, therefore, to assume the risk for agitator design and to provide detail drawings to general tank fabricators for bids. The result was disastrous.

Recognized agitator manufacturers could not quote because the design was not compatible with their standards and data were not available to check the design. Arbitrary selections had been made of shaft diameters and speeds with no reference to bearing spacing or loading. Impeller diameters, speeds and horsepower were specified without consideration of blade area or the character of the material being processed; the proportions were inconsistent. A tremendous amount of work had been expended on the project, yet the lack of essential information rendered the plan useless.

At about the same time, another major chemical company was also faced with a similar problem and a comparable urgency. Their engineers made a very complete tabulation of their requirements including space and process limitations and the properties of all the process materials. Subsequently, they called in one of their regular equipment suppliers and worked out *general* specifications that limited selection to the size and class of equipment required but not to make or manufacture. Competitive bids were solicited, the order placed and prompt delivery effected. Even considering all the time which had been devoted to the preliminary drafting of specifications, the equipment was obtained faster and at a lower total installed cost than was the case in the other instance.

## SPECIFICATION CHECK LIST

**√ *Inquiry Specification***

1. Number of units and purchase procedure.
2. Results desired.
3. Physical space or environmental limitations.
4. Preferred materials of construction, with acceptable alternates.
5. Complete physical properties for calculations involved.
6. Reference job experience, when advisable.
7. Class of equipment desired.
8. Power source and special enclosures.

**√ *Quotation Specification***

1. Number of units and component parts included.
2. Model designation or similar description.
3. Performance expected and limiting conditions.
4. Materials of construction for important parts.
5. Size of working parts and speed.
6. Special installation requirements to meet performance.
7. Overall dimensions and weight.
8. Expected power required and size of drive.

**√ *General Conditions***

1. Terms, f.o.b. point and delivery.
2. Warranty conditions, if any.
3. Service or installation included.
4. Drawings or instructions supplied.
5. Taxes, special packaging, etc.

As chemical processes have become more complicated the problems of materials of construction used in the fabrication of equipment have also multiplied. From a purely practical standpoint, important corrosion-resistant alloys must be specified by the processor. No equipment designer can be expected to select the ideal material to be used for any one of the thousands of complex gases and liquids commercially processed. Corrosion rates are usually governed by trace materials present and individual operating conditions, (Common, or well-standardized chemicals may be an exception.) The specifier must assume that responsibility in the light of his knowledge of the process. However, it is desirable that he suggest alternate materials, wherever possible. It goes without saying that otherwise costs can mount. If, for example, an equipment maker, normally fabricating one type of stainless steel in large quantities, is unnecessarily forced to use another type to meet a particular specification, his expenses and his quotation can rise inordinately. The purchase of a small lot of the special material carries with it not only the higher price which applies to small purchases but also the additional burden of shipping, tracing, handling, etc. This increment must be passed along to the equipment buyer.

Much confusion and a great deal of misunderstanding often exists because the equipment specifier tends to regard the supplier as being omniscient. The supplier has but three sources for the data he uses to check job conditions and they form the basis for his recommendation: A. Data from the inquiry itself. B. Information from the Critical Tables or literature. C. His own experience with comparable jobs. The best and most reliable source of this information should be the man who drafts the original specification.

All specifications should include these general service requirements: Accuracy; range of indication or adjustment; intermittent or continuous operation; whether the selection should be based upon a light, low-initial-cost unit, or a permanent, low-maintenance-cost installation. An outline should also summarize the type of drive desired (motor or prime mover); the plant services available for operating it (electric power, steam, compressed air, and the like); and a description of any special enclosures or construction features needed for hazardous locations.

The design and cost of some equipment are frequently determined by the physical space available or environmental restrictions. If a unit may be installed horizontally or vertically, like a heat exchanger, this should be shown. Correspondingly, the physical space requirements should be outlined so that the equipment selection may be made to leave ample room to pull a tube bundle, replace a shaft, check an impeller or repair a bearing. The important facts will be included if the specifier will anticipate the important dimensions he will check when comparing bids and making final layout.

With this information, the equipment manufacturer can make sound recommendations.

### CUTTING COSTS

Entirely apart from what should be included in specifications is the question of what should be excluded, or what should be included only where there is a good reason for its presence.

Production men are often not aware of just how costly apparently trivial requirements may be. Convenient codes designating standard specifications for specialized processes and equipment may be included unnecessarily, when specification of similar but less specialized units which will serve the same purpose would reduce cost. It must be borne in mind that if a heat exchanger, for instance, is to carry an A. S. M. E. code stamp, production must be stopped for inspection and approval.

Quotations also soar when specifications are "over engineered." The use of standard clauses calling for numerous proposals, approval and certified drawings of such small items as portable mixers or conventional diaphragm feeders involves another uncalled for expense. Excessive detail is, simply, unnecessary waste.

The general conditions in equipment specifications usually cover responsibility for material and workmanship, terms of sale, special services, etc. All such conditions should be reasonably adjusted to the actual requirements.

### GUARANTEES

A great deal of misunderstanding arises when it comes to the matter of assurances of performance. Clauses are sometimes incorporated in inquiry specifications to attempt to protect the purchaser against losses, which may be incurred by equipment failure. It must be recognized that there are factors beyond the equipment manufacturer's control, which must be appraised and understood. If burdensome stipulations are written into any specification, the equipment estimator must adjust his quotation to cover the risk assumed.

The most common points of disagreement between purchaser and supplier are those relating to corrosion, fouling, and contingent damage. Being realistic, corrosion rates can never be the basis of a guarantee under severe operating conditions. An equipment supplier can proffer an estimate of service life, but the user has primary control of the operation and should

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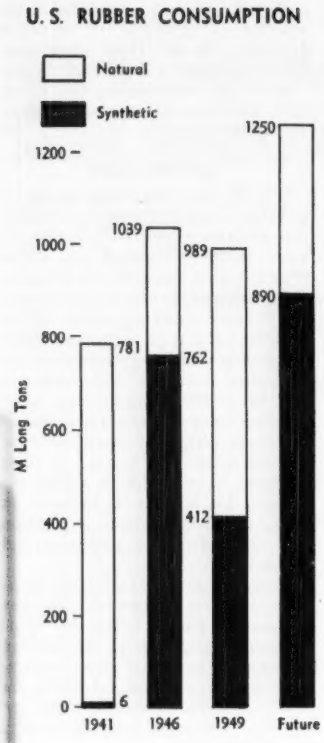


A CI REPORT

# SYNTHETIC RUBBER

## Competes for Vital Chemicals

by JOHN T. COX, JR.*
Washington, D. C.

***The synthetic rubber industry, recently called back into service, is far different from the industry left at the end of World War II. Continuous polymerization, "cold" rubber, new carbon blacks, and careful quality control have been combined with older procedures to produce a superior lower-cost material.***

THE $780 million World War II-created synthetic rubber industry has again been called into action. At the end of the War synthetic made up about 75% of the total rubber used; declined to 40% in 1949; and is expected to supply up to 80% of the total new rubber until the end of the military emergency. This is more synthetic than is called for on a supply-and-demand basis, but the Government must have natural rubber for its stockpile.

Of particular interest to the chemical industry, however, is the fact that the quantity of synthetic to be produced is set by the available chemical raw material supply and not by plant capacity. Thus a number of chemical products are and will remain short, primarily because of their use as synthetic rubber raw materials.

### NATURAL RUBBER

Some explanation of this sudden increase in synthetic production is called for, as for some months reported production of natural rubber in the Far East has been at an all time high. This has not resulted either in an abundant supply for the United States or a low price level. The explanations offered for these anomalies vary with the individual talking.

"Production" probably has been greater than shipments as lack of transportation and speculative holding for higher prices have kept much rubber from the market. Further, large Soviet purchases have contributed somewhat to this "shortage." But much of the shortage is a matter of economics.

From a low of 13 cents per pound last year natural rubber prices have soared to the present 65 cents per pound. At 13 cents rubber users replaced much of the synthetic rubber components of their formulas with natural. But when the price of natural rubber reached 5 cents per pound higher than synthetic, there was a large-scale return to the high-synthetic formulas. Thus with natural at 65 cents there is a tremendous economic inducement to use a maximum of synthetic at the government's price for synthetic, 18.5 cents per pound. Where there is a continuing plentiful supply of both synthetic and natural a lower price tag on synthetic of only 3-4 cents per pound is probably sufficient to assure maximum use of the synthetic material.

Little can be said as to when this latter condition will prevail, but it is certain that it will not be until some time after completion of the fighting in Korea. Further, a surplus of natural rubber will be felt in the U. S. market only after the government stockpile has been built up to a desired maximum. One may as well resort to the crystal ball in forecasting the time when these two conditions will come to pass.

### THE SYNTHETIC INDUSTRY

A few general facts will suffice to paint the background of the development of the synthetic rubber industry in the United States.

During World War II $780 million was spent by the government for the construction of facilities for the manufacture of synthetic rubber copolymers and rubber chemicals. For this huge sum the government obtained an industry which in its peak year manufactured synthetic rubber at a rate over 800,000 long tons per year. GR-S was the major product and was produced at a maximum rate of 710,000 long tons per year. The rest was made up of 60,000 tons of butyl rubber and 40,000 tons of other special rubbers such as neoprene and GR-N.

At the beginning of 1950 the rubber program owed the United States

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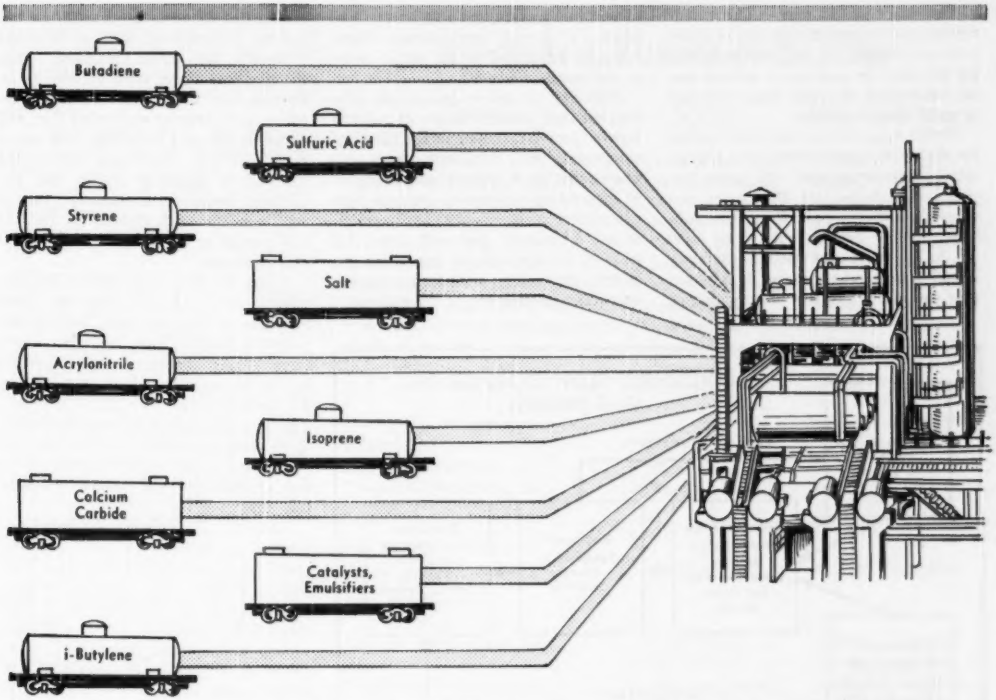



Treasury about $400 million after paying the actual out-of-pocket cost for manufacture, paying state and local taxes, and 2% interest on the money invested—a slightly higher rate than that paid by the Treasury. The value of the present plants owned by the government exceeds the net cost to the taxpayer by at least $150 million.

### GR-S TODAY

The general purpose synthetic rubber (GR-S) industry, practically all of which is government owned, consists principally of a group of fourteen GR-S copolymer plants, seven of which have been at least partially converted to the manufacture of the so-called "cold" rubber. Whether some more of the GR-S capacity will be converted to the cold process is still to be determined. However, the conversion can be simply accomplished by the installation of suitable refrigeration equipment. The present 180,000 ton per year cold rubber capacity required an additional investment of only $5 million.

Manufacture of GR-S consists essentially of the copolymerization of butadiene and styrene in the presence of suitable amounts of emulsifiers and catalysts. Commonly one thinks of GR-S as a single product. Actually in a single month the government plants have made as many as 45 different synthetic rubbers.

### BUTYL RUBBER

Butyl rubber has definitely displaced natural rubber in passenger car inner tubes. It is so far superior to natural rubber in this application that one wonders why it is not held as a premium rubber. Its major advantage is its ability to retain air. Butyl tubes leak air only 10% as fast as natural rubber tubes.

Butyl rubber is produced by copolymerization of 98% isobutylene and 2% isoprene by mass polymerization at —150°F. The isoprene is used to provide the needed unsaturation for vulcanization.

The product is formed in a continuous manner in an ethylene-refrigerated vessel with the polymerization catalyzed by aluminum chloride dissolved in methyl chloride. The reaction takes place in a micro-second and addition of hot water to the outgoing fluids kills the reaction. The rubber collects in small nodules that are dried, milled and extruded into flat sheets.

The latest estimates show that about ninety thousand tons of new rubber are used each year for the manufacture of inner tubes. The present all-out butyl capacity, however, is only 75,000 tons, making it a safe bet that this rate of production will have to be raised during the next five years, for butyl is also finding use in other fields.

### NITRILE-DIENE COPOLYMERS

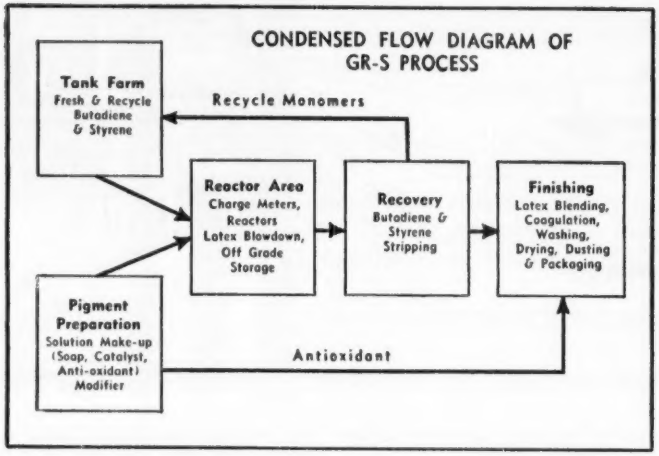
Nitrile-diene rubbers are produced by polymerization of various concentrations of acrylonitrile in butadiene. It would be more widely used in general-purpose rubber applications if cheaper acrylonitrile could be obtained. Due to the marked solvent resistance of this type of rubber it finds wide use in the mechanical-goods industry.

The N-type rubbers are produced solely by private manufacturing concerns. At the present time Firestone Tire and Rubber Co. at Akron, O., and B. F. Goodrich Chemical Co. at Louisville, Ky., and Goodyear Tire and Rubber Co., Akron, are the largest producers.

Work conducted in the latter part of 1940 and during 1941-2 showed this to be a useful polymer for tire manufacture. But the cost of acrylonitrile is too high in comparison with the cheaper styrene. Nitrile rubbers are in direct competition with neoprene for the mechanical goods market and are priced accordingly. For example, neoprene has a specific gravity of 1.25 and a

selling price of 32 cents. The nitrile rubbers have a specific gravity of about 1.00 and could thus sell competitively for 40 cents. In addition to solvent and oil resistance, they are more resistant to cold than neoprene.

Nitrile-type rubbers are now selling for 40-50 cents per pound with acrylonitrile costing around 35 cents per pound in tank-car lots This price prevents their use in general-purpose rubbers, but an acrylonitrile price level of 20-25 cents per pound probably would permit extensive use. It is hoped that the increasing use of acrylonitrile in the formation of synthetic fibers will eventually bring its price down to the point where nitrile-type rubbers, not yet fully explored because of this economic disparity, will become important factors in the general purpose rubber market.




### NEOPRENE AND SPECIAL RUBBERS

Prior to World War II neoprene was a very small factor in the overall United States rubber supply. During the war the Government erected plants to make 60,000 long tons per year and neoprene gained a foothold in the wire and cable industry and the chemical goods fabrication which it has not lost. Since the War, neoprene has been returned to private manufacture and a sizable plant expansion is under way.

The primary raw materials for neoprene are acetylene and hydrogen chloride. The price of carbide, the raw material for acetylene, has risen as power costs have increased. Serious consideration is now being given to other methods of manufacture.

Another series of rubbers that have made an appearance are the butadiene-acrylate copolymers which have certain valuable compounding characteristics for special applications. These rubbers are priced in the same range as the nitrile rubbers.

Although not yet in commercial production, still another series of rubbers shows promise, copolymers of vinyl compounds with butadiene. It is well known that such rubbers have extremely interesting properties. As yet high production costs prevent commercialization. Ultimately they will come, and with it certain special operating requirements such as need for recovering unreacted monomers. Unquestionably there will be other copolymers, as the possibilities have by no means been exhausted.

## RAW MATERIALS

As has been noted before the raw material supply situation will control the amount of synthetic rubber which is manufactured. As is the case for nearly all chemical products, it can be prepared by more than one process, widening the impact on the chemical industry.

### BUTADIENE

Butadiene is the key to the major part of the synthetic rubber program. During the war it was made by breaking down ethyl alcohol, butane, butylene, or petroleum naphtha. All of these sources have fallen by the wayside as major factors in production with the exceptions of butylene and butane. However, there is a small quantity of by-product butadiene produced from naphtha cracking at the present time.

Alcohol butadiene is not favored for the obvious reason of the high cost of the ethanol-derived product. However, it must be borne in mind that the cost of converting ethanol into butadiene is the lowest of all of the many processes that make butadiene. Thus the day may come when ethanol as an intermediate in some process can assume an *in process unit value* that will allow its use as a butadiene raw material. This latter view may inspire real caution in planning among the petroleum refinery academists; but it still appears that alcohol is only a war-period primary raw material for this monomer.

There has been little change in techniques or yields of butadiene from butylene or butane since the rubber program began. Raw material prices have swung through a wide range; but in the main the effect on the price delivered at copolymer plants is small. The principal factor in butadiene costs in existing petroleum plants is the rate of operation. More continuous operation of facilities will materially lower this cost.

Butadiene is probably the most neglected tonnage, high purity petrochemical on our industrial scene. This neglect implies that there is only a single major use anticipated for this reactive hydrocarbon, that is certainly a very narrow and unjustified view. Early development of polybutadiene rubber seems likely to occur soon and nylon from butadiene is in the immediate offing.

### STYRENE

Styrene as a general plastic raw material had little attention prior to 1941. However, wartime development of large-volume production of styrene dropped its production cost to a point where it is now the most popular plastic.

Styrene production requires benzene and ethylene as primary raw materials. In the early part of World War II a great deal of this ethylene was made from alcohol and two producing units are now dehydrating alcohol. Cracking of propane, however, produces ethylene at a substantially lower cost. The problem of benzol supply was solved during wartime by huge imports from England. However, since the war we are faced with a declining benzene supply from the coal-based industries. Combined with increasing uses for benzene this shortage became acute in the first two quarters of 1950 and it has been estimated by other authorities that a ten million gallon deficit will exist in 1950. The petroleum industry has not been inclined to take over benzene production even at relatively high prices under long contracts because of the need for anti-knock and rich mixture performance provided by the petroleum benzene raw materials.

Foreign-produced benzene, where available, is above the current price level, because of its use on the Continent as a very desirable motor fuel, sold at wholesale at around 40 cents per gallon.

Several years ago it was predicted that benzene would become an extremely scarce commodity; but such predictions were loudly pooh-poohed in all quarters. But these counterstatements were hastily withdrawn in the very early part of 1950 when it became apparent that the benzene shortage was upon us, and seemingly here to stay.

While styrene represents a tremendous demand on the available benzene supply, many other large segments of American chemical industry have been increasing their demands. Unfortunately the operation of coke ovens, principal source of benzene, cannot give higher yields of this by-product. Wholly new sources must therefore be sought or ways found to make-do on what is available.

Normal GR-S is a copolymer of 72% butadiene with 28% styrene but this ratio can be varied. But when styrene first became extremely scarce during 1950 the styrene content was reduced in some cases to 24%. The product is a tire rubber which has high abrasion resistance for treads, if properly compounded with suitable carbon black. This advantage, however, is offset somewhat by slightly greater tendency to tear.

In any single case the decision as to hydrocarbon ratio must take account both of price and availability of hydrocarbon and of the resulting change in rubber properties. The synthetic industry looks forward to the day when both monomers will be available in sufficient quantity at favorable prices so that the optimum ratio for best service may be used. Meantime the styrene content is going to be determined by relative availability more than by any other consideration.

## SYNTHETIC RUBBER FACILITIES

| Operator | Location | Capacity (long tons/yr.) Rated | Demonstrated |
|---|---|---|---|
| **COPOLYMER (GR-S)** | | | |
| Copolymer Corp. | Baton Rouge, La. | 30,000 | 37,500 |
| Firestone Tire & Rubber Co. | Lake Charles, La. | 60,000 | 75,000 |
| Firestone Tire & Rubber Co. | Akron, Ohio | 30,000 | 30,000 |
| General Tire & Rubber Co. | Baytown, Texas | 30,000 | 37,500 |
| B. F. Goodrich Chemical Co. | Port Neches, Texas | 60,000 | 75,000 |
| B. F. Goodrich Chemical Co. | Institute, W. Va. | 90,000 | 112,500 |
| Goodyear Synthetic Rubber Corp. | Houston, Texas | 60,000 | 75,000 |
| Kentucky Synthetic Rubber Corp. | Louisville, Ky. | 30,000 | 37,500 |
| Minnesota Mining & Manufacturing Co. | Los Angeles, Cal. | 75,000 | 83,750 |
| Phillips Chemical Co. | Borger, Texas | 45,000 | 56,250 |
| U. S. Rubber Co. | Naugatuck, Conn. | 30,000 | 30,000 |
| U. S. Rubber Co. | Port Neches, Texas | 60,000 | 75,000 |
| Total | | 630,000 | 755,000 |
| **BUTYL** | | | |
| Esso Standard Oil Co. | Baton Rouge, La. | 38,000 | 42,000 |
| Humble Oil & Refining Co. | Baytown, Texas | 30,000 | 38,000 |
| Total | | 68,000 | 80,000 |
| **NEOPRENE** | | | |
| E. I. Dupont de Nemours & Co. | Louisville, Ky. | 60,000 | 60,000 |
| **BUTADIENE** | | | |
| Petroleum | | | |
| Cities Service Refining Corp. | Lake Charles, La. | 55,000 | 55,000 |
| Esso Standard Oil Co. | Baton Rouge, La. | 15,000 | 20,000 |
| Humble Oil & Refining Co. | Baytown, Texas | 30,000 | 40,000 |
| Neches Butadiene Products Co. | Port Neches, Texas | 100,000 | 125,000 |
| Phillips Petroleum Co. | Borger, Texas | 56,200 | 56,200 |
| Sinclair Rubber, Inc. | Houston, Texas | 50,000 | 62,500 |
| Shell Chemical Corp. | Los Angeles, Cal. | 55,000 | 55,000 |
| Standard Oil Co. of Cal. | El. Segundo, Cal. | 18,000 | 20,000 |
| Total | | 379,200 | 433,700 |
| Alcohol | | | |
| Carbide & Carbon Chemical Div., Union Carbide & Carbon Corp. | Louisville, Ky. | 60,000 | 60,000 |
| Koppers Co., Inc. | Kobuta, Pa. | 80,000 | 120,000 |
| Total | | 140,000 | 180,000 |
| **STYRENE** | | | |
| Dow Chemical Co. | Los Angeles, Cal. | 25,000 | 36,000 |
| Dow Chemical Co. | Velasco, Texas | 50,000 | 96,000 |
| Dow Chemical Co. | Midland, Mich. | ..... | 36,000(est.) |
| Koppers Co., Inc. | Kobuta, Pa. | 37,500 | 45,000 |
| Monsanto Chemical Co. | Texas City, Texas | 50,000 | 60,000 |
| Carbide & Carbon Chemical Div., Union Carbide & Carbon Corp. | Institute, W. Va. | 25,000 | 25,000 |
| Total | | 187,500 | 298,000 |

### ISOBUTYLENE

Isobutylene is the major constituent of butyl rubbers. It is a by-product of catalytic cracking and the supply varies seasonally with the gasoline market. Its current demand is as a component of aviation gasolines. But some far-seeing prophets predict that increased use of jet engines for aircraft will change the market drastically for aviation fuels to those that do not require isobutylene as a component. However, the production of jet fuels may also change the refinery's balance so that special measures may still have to be taken to produce the necessary amounts of isobutylene for butyl rubber.

Isoprene has made its appearance as a large scale industrial chemical as a result of butyl manufacture. It can be prepared from dipentene (high priced) or from petroleum naphtha (low priced). The petroleum process now is the only commercial method.

Isoprene is present in small quantities in nearly all thermally cracked naphthas, but its concentration and separation except under very special conditions are unecomonic. Isoprene has been somewhat neglected both as a primary and secondary monomer. It will bear watching in the immediate future.

### ETHYLENE

Ethylene has two major uses in the synthetic rubber industry. One is as a refrigerant for the butyl rubber process (—150°F.) and the other as an alkylation agent for benzene in styrene production. Ethylene for refrigeration presents no particular prob-

lem because the butyl plants are adjacent to refineries that have sufficient streams containing readily extractable ethylene.

For styrene the approach is somewhat different. As has been previously mentioned the primary sources are ethyl alcohol and propane. The yields were satisfactory from alcohol, but the initial cost of ethanol is too high to compete against propane-produced ethylene even with a process that is only 40 to 50 percent efficient. A tremendous amount of testing is now going on for cheaper and more efficient processes. Dehydrogenation of ethane by catalytic processes gives good yields, and ethane is cheaper than propane. This process probably will be the next major development in ethylene manufacture.

### SOAPS

A major development of the synthetic rubber program was the organization for procurement and enforced specifications for very large quantities of fatty acid soaps. The Government synthetic rubber program was probably the largest single buyer in history of a single variety of soap. This was developed by the entire soap industry in a cooperative effort which resulted in a product of nearly unvarying quality with respect to polymerization speed, fatty acid content, saponification value, and moisture content.

Concurrent with this development a large rosin manufacturer, attempting to produce a substitute for the then scarce natural fatty acids necessary for soap-making, developed a superior rosin-acid soap made by the disproportionation of "K" wood rosin. This rosin soap became one of the main constituents for a whole series of highly superior rosin-acid soap polymers that stemmed from the initial development, GR-S10.

Similar high-grade soaps have been developed using potassium hydroxide in place of caustic soda where the demands of viscosity were such that sodium soaps were not applicable.

### REACTION CHEMICALS

A number of chemicals, other than the prime monomers, are used in the polymerization of GR-S. Chain modifiers are necessary for propagation of a polymerization system. Also they prevent cross linking of the polymer chains. Without the use of these modifiers polymerization would proceed at differential rates (depending upon temperature, catalyst concentration, and other factors) to produce a hard, horny unworkable substance of little commercial value. The Germans recognized this early and out of their early research a modifier known as diisopropylxanthogenate was developed.

Later American research developed dodecyl mercaptan which was and still is the principal modifier for standard purpose 122° rubber. Since the major constituent of dodecyl mercaptan is lauryl alcohol, derived from cocoanut oil the problem of supply during the war years became critical.

This shortage was met by development of a series of relatively unlimited supplies of petroleum mercaptans, one being a reaction product of triisobutylene and hydrogen sulfide, known as sulfole or B-8. Its use, however, was limited in the early part of the program due to minor processing difficulties encountered by rubber consumers using polymers made with it. Use has increased tremendously in the past two or three years with the introduction of cold rubber, as it appears to be a specific for this type of polymerization. Many other attempts have been made to develop satisfactory modifiers, but the low cost of the petroleum mercaptans have prevented extensive use.

A reaction catalyst is also necessary. Potassium persulfate, produced by electrolysis of potassium sulfate, was the first applied. The electrochemical industry produced an exceedingly pure product at low cost that has been a standard material for a number of years. Fairly large quantities are still used in high temperature polymerization. For low temperature polymerization it is not sufficiently active, nor does it fit into the required Redox systems.

The first cold rubber catalyst was cumene hydroperoxide used in conjunction with sugar and ferrous sulfate. Lately a series of new hydroperoxide catalysts has appeared, one of the most valuable being diisopropyl benzene monohydroperoxide which is exceedingly fast at low temperature.

A major operation in rubber polymerization is to stop the reaction at the desired conversion. In high temperature polymerization the reaction may be stopped by stoichiometric addition and neutralization of the residual catalyst or by "poisoning" due to addition of known catalyst poisons. However, since the time factor is important, "short-stopping" has been by quick stoichiometric means. Hydroquinone is the standard for this. It is a photographic chemical for which large production facilities are in existence. The only problem is to supply the manganous oxide needed for the hydroxylation of the quinone structure.

In low-temperature polymerization where much of the quality of product is dependent upon exact short-stopping at much lower conversions than those encountered in high temperature polymerization, stoichiometric short-stopping is not effective. Recourse has been made to poisoning those free radicals which promote activity. At present 2-4 dinitrochlorbenzene is the most important. However, this material is not without hazard. Its peculiar property of inducing dermatitis requires rigid safety precautions wherever it is used.

## RESEARCH

Production of synthetic rubber has been far from a static process with changes and improvements continually cascading in, producing both a superior and cheaper product.

### CONTINUOUS POLYMERIZATION

Although at first polymerization was a batch operation the chemical engineering staffs realized that the major reaction was quite suitable for continuous operation. Within two years after the beginning of the program a large scale experiment was run in one plant which was immediately successful. Shortly thereafter, the major part of all plants was converted to continuous polymerization; the batch method being used primarily for specialty rubbers.

One problem here is the tendency of the flowing materials to have uneven rates of passage through the large vessels of a polymerization line. "Short circuiting" was greatly reduced by insertion of dividing walls in the existing polymerization vessels. These, in effect, made two vessels in a single container. The physical connection of one large reactor to another through moderately sized pipes further reduced short-circuiting.

As was expected, continuous polymerization reduced labor cost, give higher throughput with more uniform quality, and lower operating cost.

### COLD RUBBER

The most spectacular advance in the synthetic rubber program was the introduction of low-temperature polymerization in February, 1948. The major process change is a modification of reactor operation to form the copolymer at a low temperature, usually 41°F.

For operation at this temperature a quite different formulation of the charge to the reactor is required. The most significant change is the addition of a more active polymerization catalyst to increase the rate of polymer formation above that of a normal GR-S charge if reacted at low temperature. Such a charge will react at this low temperature; but it is uneconomic because the plant capacity would be tremendouly reduced to a point where the high capital cost could not be tolerated even by Government organizations.

Using the more vigorous catalysts, required for economic speeds in cold rubber formation, a chemical agent must also be used to stop the reaction at the desired point, a "short-stopper." Without this the polymers would be so cross-linked that the resulting rubber would not be suitable for most applications. It is a matter of great importance that the formulas for any particular purpose be so balanced that the polymer is formed at just the right rate to provide linkages which will give optimum performance.

Cold rubber is widely used in automobile tire treads. At the present stage of development cold rubber must still be mixed with special types of furnace carbon blacks to bring out the best road-wear characteristics of the polymer. Production of these special blacks is limited and this may account for the delay in more universal usage of this new polymer. Development, however, is being made in use of other types of black and, while there are no results available at this moment, it is expected that satisfactory methods will soon be forthcoming.

Cold rubber will have a tremendous economic impact on the rubber industry once its usage is firmly established. A conservative claim is for a treadwear 30% better than best natural rubber.

Cold rubber does not meet the exacting requirements of a carcass stock for heavy duty bus and truck tires. Polymerizations conducted as low as 14°F and 0°F have not as yet produced suitable polymers.

Continuous polymerization techniques have been applied to low temperature polymerization with excellent results. It is contemplated that the major portion of the plant installations will adopt this method.

### MASS POLYMERIZATION

Mass polymerization is employed in plastics manufacture and formation of butyl rubber. No solvents or emulsifiers are employed and the prime monomers are treated directly with catalysts under varying conditions of temperature and pressure.

At present there is no commercial production of GR-S by this technique, but tremendous amount of research has been done and the process is in pilot plant. Such new products as polybutadiene, isobutylene-styrene and butadiene-styrene mass polymers are now being tested by the industrial field. Initial laboratory tests on polybutadiene obtained by this method show great promise as a carcass rubber.

Mass polymerization techniques offer great possibilities in simplifying present polymerization methods for general purpose rubbers. Research trials are at present using finely powdered sodium in the place of the static low-area sodium catalyst developed many years ago in Europe and substantial further advances are to be expected within a few years.

### MASTERBATCHING

One of the most unique developments of the synthetic rubber industry was the emergence of masterbatching as a major production factor. Here various pigments are incorporated into rubber while it is still in the liquid state and provides a tremendous power saving over the normal milling of dry pigments into dry rubber.

As employed by the synthetic rubber industry the method consists of the preparation of a water dispersion of the pigment (carbon black, clay, etc.), and mixing with the synthetic latex just before coagulation. The simultaneous precipitation of rubber and pigment produces a uniformly mixed solid material at little or no power cost.

Since rubber must be normally broken down (reduced in viscosity) before pigment incorporation, masterbatching eliminates the second step. The breakdown step is all that is needed to form the finished mix.

This method will probably see much further use with the developing technology of synthetic rubber.

### QUALITY CONTROL

At the beginning of the large-scale synthetic rubber program, it was soon apparent that quality standards were a permanent need. In the 18 plants, producing synthetic rubber at the height of the program, the Government rapidly developed a series of strictly enforced specifications for all possible variations in composition and processing of the polymer. Enforcement of these manufacturing specifications produced a system of exact product control without parallel in the American rubber industry.

This system of polymer control has also been extended to the natural rubber industry; and a new system of rubber grading has been recently announced which does away with archaic standards of color and appearance of the natural sheets.

Rubber chemical consumers also are now demanding controlled quality in other ingredients, to meet constantly narrowing specifications for rubber goods. The rubber chemical manufacturer has had to meet these demands to survive. Quality controls are in effect on these materials that were regarded impossible for large volume chemicals a decade ago. The same set of circumstances is forcing the carbon black manufacturers into similar quality control. Despite the difficulties involved, a tremendous benefit is realized in conservation of natural resources, rigid plant control, and reduced amounts of off-specification materials.

The synthetic rubber industry has also caused rapid development of special carbon blacks of suitable compounding characteristics for each end-product. Of particular interest are the high abrasion furnace blacks which are made from crude oil fractions rather than natural gas. It is claimed that the product quality can be controlled to a much greater degree using this method of black manufacture. The high abrasion furnace blacks in conjunction with cold rubber have given astounding results in passenger car tires.

## POLICY PROBLEMS

In planning America's rubber supply, the government has changed the current ratio of 60% natural to 40% synthetic to 70% synthetic and 30% natural, to allow the government stockpile to be increased. The immediate result is a greatly increased demand for synthetic.

Vexatious problems of prime monomer supply have thus arisen and their solution is under way. But these monomer supply problems are no greater than those of supply of other reaction chemicals and rubber components such as pigments. These latter problems have received only secondary attention and at this time there is serious question as to the availability of sufficient anti-oxidants, essential for the enlarged synthetic rubber operation. There is also a serious situation in the supply of hydroquinone. Similarly there is an additional problem in the enforced use of synthetic rubber in very large quantity, in that it will require larger amounts of many different rubber-compounding accelerators and other organic chemicals for which even now supplies are inadequate.

Since this whole program envisions a normal civilian economy along with stockpiling and defense, serious steps still have to be taken in order that the production goals may be attained within a reasonable time.

A second policy problem concerns patents. Research conducted under government programs and by private enterprise has different approaches and different results. Private industrial research is conducted with a profit motive, which must be continued.

America's great rubber industry is somewhat bewildered by the events of the last decade. It created a vastly successful enterprise for the Government; it provided the industry's brains, patents, and its know-how. Now the return to private enterprise is denied.

# CHEMICAL SPECIALTIES

## Big and Small Compete in Household Bleach

EDITORIAL STAFF REPORT

**STANDARD HOUSEHOLD SPECIALTY—sodium hypochlorite bleach liquor—is large-volume business shared by many producers.**

THE COLORED jug of sodium hypochlorite bleach is almost as common a household item as soap. (In its 1949 consumer analysis, *The Milwaukee Journal* found that 91.8% of consumers interviewed bought liquid bleach.) Although there are a few well-known national trade names in the field, many of the estimated three thousand odd producers of sodium hypochlorite in this country market their own products. Such specialties provide one major outlet for sodium hypochlorite, 1947 production of which was estimated at 300 million pounds, basis 15% available chlorine. (Other major outlets are commercial laundry and textile mill bleaches.)

From the large number of manufacturers carrying household liquid bleach in their lines, it is obvious that small local entrepeneurs are able to compete successfully with large manufacturers. Since household bleaches are usually about 5% aqueous solutions of sodium hypochlorite, the man whose market is close to his plant saves considerably on shipping rates for this low-cost bulky product. Moreover, it is easily manufactured, and all major alkali producers provide literature and engineering counsel to assist prospective manufacturers with the technical problems involved.

Sodium hypochlorite is usually prepared from chlorine and caustic soda according to the following reaction:

$$2NaOH + Cl_2 \longrightarrow NaOCl + NaCl + H_2O$$

Stable bleach solutions are obtained with excess caustic.

Among the terms used to designate the strength of such solutions are trade percent, grams per liter available chlorine and percent available chlorine or sodium hypochlorite. ("Available chlorine" refers to that weight of chlorine that would have the same effect as a given weight of sodium hypochlorite, i.e., 100 pounds of bleach with 135% available chlorine is as effective as 135 pounds of liquid or gaseous chlorine.) The first expression, used in the bleach trade but not actually a percent, represents grams available chlorine per 100 c.c. of solution. The second is merely a weight-volume relationship, while the third is an actual percent by weight. Concentration of sodium hypochlorite by weight, expressed as percent, is in current usage for household bleach. This specialty is the only product to be considered in this discussion.

### MANUFACTURE

The strength of the product depends upon the concentration of caustic soda used and addition of chlorine in proper proportions. Table I shows the amounts required for the most common different concentrations of household bleach prepared from chlorine and caustic.

On the following page the general arrangement of a sodium hypochlorite plant is illustrated.

The two major pieces of equipment needed are an iron tank for dissolving or diluting the caustic soda and a chlorinating tank, generally made of concrete. Where solid caustic is used, a tank with a grate on which solid material is placed is best, for upon covering with water, the caustic dissolves without agitation, although recirculation can be used to hasten the process. The solution must be allowed to stand to dissipate the heat of solution that is evolved and to allow insoluble materials to settle out before transfer to the chlorinator. This is particularly important, for if iron scale gets into the chlorinator, colored compounds that give the final bleach liquor off-colors objectionable to the consumer, will be formed.

Although chlorinating tanks are commonly made of concrete, rubber- or plastic-lined steel tanks are of advantage but they are high in initial cost and care must be exercised not to damage the lining. For small installations, tanks of chemical stoneware or glazed sewer tile are satisfactory. Depth of this tank should be sufficient to prevent free chlorine from bubbling through the solution; usual minimum is five feet.

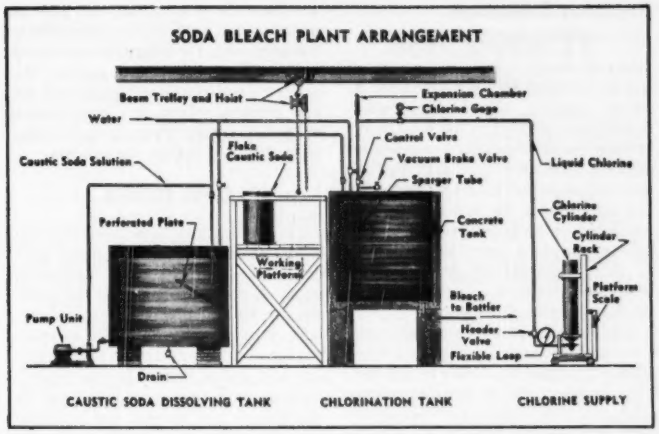
Chlorine is added as rapidly as the solution can absorb it; however, the rate should not be such that free chlorine bubbles through the solution or the temperature exceeds 80-86° F. Liquid chlorine is the best form to use for most operations, and only in small-scale units is the gaseous form used. Some kind of diffuser for the chlorine is required, but what type will depend upon the concentration of bleach being made, the particular installation involved and the individual maker's preference.

### EQUIPMENT

Among chlorine diffusers available are coarse-grained, porous tubes with hard rubber fittings. Small operators using chlorine gas find these particularly useful. A sparger tube made of lead or silver affords good diffusion because of the high velocity with which the chlorine is emitted. This is a long tube reaching to the tank bottom where it is bent horizontally and flattened out into a fish tail.

**TABLE I—MATERIALS FOR 1000 GAL. NaOCl BLEACH**

| *NaOCl* | *Pounds* | *Caustic Soda* | | *Gals. $H_2O$ for diluting caustic* | |
|---|---|---|---|---|---|
| *% by wt.* | *Chlorine* | *Lbs. Solid or Flake 98%* | *Gal. 50% Liquid* | *98%* | *50%* |
| 2.5 | 209 | 261 | 40 | 979 | 949 |
| 3.0 | 250 | 314 | 48 | 975 | 938 |
| 3.5 | 292 | 366 | 56 | 970 | 938 |
| 4.0 | 334 | 418 | 64 | 966 | 918 |
| 4.5 | 375 | 470 | 72 | 962 | 907 |
| 4.9 | 417 | 523 | 80 | 958 | 897 |
| 5.4 | 459 | 575 | 88 | 953 | 887 |
| 5.8 | 500 | 627 | 96 | 949 | 876 |




*Columbia Chemical Div., Pittsburgh Plate Glass Co.*

Where the final concentration of the bleach does not exceed 60 grams available chlorine per liter (as is the case with household bleach) a lead pipe diffuser can be used. This extends down from the control valve on the chlorinator to the bottom of the tank where it forms a loop closed at the end, but perforated with 1/16 inch holes over a 7 or 8 foot length of loop. In tanks as deep as 8 feet or more, an open-end lead pipe of diameter up to ½ inch, leading down to the bottom of the tank is suitable.

Likewise with large and deep tanks, glass tubing of ½ inch outside diameter can be used if simple precautions against breakage are taken. This can discharge centrally near the tank bottom, although two discharge points may be needed in long rectangular tanks.

In determining the amount of chlorine to add to a given bath, the operator may use the complete contents of a given size chlorine container, or weigh out the required charge from a chlorine cylinder by means of a platform scale. A combination of these methods, i.e., using the complete contents of a number of cylinders and of an amount from another as determined by the scale, is a simple variation. Chemical methods of checking on the chlorination include an indicator test with phenolphthalein ("flash test" in which chlorine is added until the pink color given by addition of few drops of indicator is bleached out in a few seconds) and determination of available chlorine as the reaction progresses. Chlorine flow meters, when carefully calibrated for a given operation, are especially useful in large operations where process conditions are fairly constant.

There should be a pressure gauge between the chlorine tank and the chlorination tank valve. Tubing from the pipe line to the chlorine cylinder should be of flexible copper, while the piping can be of iron.

Suck-back of bleach solution when chlorination is completed is both corrosive to the system and dangerous, so adequate precautions must be taken in design to prevent this. An automatic or a manually operated vacuum break will open the system to the atmosphere and prevent suck-back. The former requires considerable maintenance; the latter depends on the operator's giving proper care to his job. Another sure-fire method if the operation is always carefully carried out is to disconnect the chlorine line after chlorination, while a fourth system is to use a barometric leg to limit suck-back. The latter requires much headroom and exposes a long length of pipe to corrosion.

## COOLING METHODS

An important aspect of the production of sodium hypochlorite is that the reaction between the caustic soda and chlorine evolves heat. Since high temperatures result in formation of chlorates at the expense of hypochlorite, and cause darkening of the bleach, this heat must be removed to keep the reaction below 86° F. and preferable below 80° F. At lower concentrations of bleach, cooling may be unnecessary or of only minor concern, but at the concentrations at which household bleach is normally made, some process provisions must be made for it.

A variety of means is available for controlling the temperature. The initial caustic solution may be pre-cooled sufficiently with mechanical refrigeration, cooling water, addition of ice, or a combination of these methods. Pre-cooling can be used in some household bleach plants by starting with a caustic solution at an initial temperature such that the temperature will not exceed a specified figure. Table II shows the temperature rise for different concentrations of hypochlorite bleach, and the maximum reaction temperatures to which such solutions will rise from different starting temperatures. A manufacturer making a 4.9% sodium hypochlorite solution, it can be seen, can operate safely (maximum expected temperature of 86° F.) by starting with a temperature of 56° F.

Where it is not feasible to cool the caustic solution sufficiently to keep the maximum chlorination temperature within a desirable limit, cooling during chlorination is employed, again by the same variety of methods. In general, a combination of pre-cooling and cooling during chlorination is best. When the cooling coils are located in the chlorinator, they are generally of glass or stoneware; when installed in the caustic tank, they may be of iron or steel.

If adding ice is a cooling method used, the original caustic solution must be prepared at a greater concentration to allow for the melting of the ice. This places a limitation on the amount of ice that can be used without causing crystallization of the solution, and the ice may have to be added gradually as chlorination proceeds so as not to cool more-concentrated-than-usual solution below the crystallization point. At lower concentrations, however, this is not a problem and the total amount of ice can be added at the start.

**TABLE II—HYPOCHLORITE TEMPERATURE RANGES**

| NaOCl % by wt. | Temperature Rise °F. | Starting Temperatures Resulting in Maximum Temperatures of 86 °F. | 104 °F. |
|---|---|---|---|
| 2.5 | 15 | 71 | 89 |
| 3.0 | 18 | 68 | 86 |
| 4.0 | 24 | 62 | 80 |
| 4.9 | 30 | 56 | 74 |
| 5.8 | 36 | 50 | 68 |

After chlorination, the finished bleach solution can be run to storage. Before bottling, however, it is advisable to filter it through crushed quartz, glass wool or Vinyon, or to allow it to stand still until the small amount of insoluble material, principally from the hardness constituents in the water, settles out. Storage tanks for the bleach liquor are constructed similarly to the chlorination tanks.

In laying out a plant, it is best to take advantage of gravity flow from caustic tank to chlorinator to bleach storage. Where such an arrangement is not possible, it is better to pump the caustic solution since iron lines and iron pumps are suitable equipment. If the bleach liquor must be pumped, a

more expensive hard rubber or glass pump is called for.

### FILLING AND SELLING

Although some small operators may fill directly from the chlorinators or storage tanks with outlets of suitable hard rubber tubing, automatic filling and labeling machines are used by companies of any substantial size. Common retail sizes are pint, quart, two-quart and gallon bottles. These are made of the familiar brown or amber colored glass to prevent exposure of the solution to light which has an effect on the stability of the material. Although the manufacturer can control factors influencing stability during manufacture by avoiding copper, nickel and cobalt impurities that act as decomposition catalysts and controlling the alkalinity of the solution, he has no control over storage conditions in stores and homes. Quite often these bottles are kept at elevated temperatures, and the resultant decomposition causes popping of rubber stoppers and even cracking of bottles. As a precaution against too great pressure, vented caps and stoppers have come into use.

Although a familiar sight in the laundry, household bleach has a number of other important household applications that make it both an indispensable specialty, and one with a rapid turnover. It is also used as a stain remover, general cleanser and deodorant, disinfectant and germicide. So widespread is its use, that it is not only a grocery and drug store item, but in the suburban areas, delivery routes serviced by truck and handling this one item exclusively, have been established.

Household bleach liquor is an attractive product for a manufacturer entering the household specialty field or seeking an addition to an existing line. It is particularly adapted to local exploitation for the large percent of water in the product and high shipping rates tend to limit a producing unit's marketing area. Large producers have many plants in suitable locations, while small companies confine their activities to one area. Successful businesses of both types attest to the demand for the product.

### REFERENCES


1. Levitt, Benjamin. "Liquid Laundry Bleach". *Chemical Industries*, XLVIII, 1 (Jan. 1941).
2. *Chlorine*, bulletin of Pittsburgh Plate Glass Co., Columbia Chemical Division & Southern Alkali Corp., 1948.
3. *Chlorine Bleach Solutions*, Solvay Technical & Engineering Service Bulletin No. 14, The Solvay Process Division, Allied Chemical & Dye Corp., 1949.
4. Coyle, Thomas, "Active Chlorine Bleaching Compounds." *Chemicals and Drugs Industry Report*, U. S. Dept. of Commerce, July 1949.


## Research Evaluation

(Continued from page 725)

ments of steam, water, and electricity can be obtained in the pilot plant. As far as possible, all plant operations should be duplicated in the pilot plant; nothing should be assumed or taken for granted. It is after this stage that the chemical engineers must be able to say: We can produce the new product successfully; in order to produce half a million pounds a year, we will have to spend $275,000 for buildings and equipment; the total cost of the chemical is estimated at 39¢ per lb.

During pilot-plant operations, the market development group will have obtained samples to submit to prospective customers. Early sampling of the product is very important: Prospective customers can very often make suggestions for changes in the product which may save months of work later on. This is particularly true where the product is not a pure chemical but a formulated product; e.g., one of the many insecticides, fungicides, or herbicides. Or in rubber chemicals, the trade may favor a waxy product rather than an oil. In any event, collaboration with the potential customer is a good way to save time and money.

### THEN SEMI-WORKS

After the pilot-plant trials will come another round-table conference to examine critically the new information acquired: to re-estimate profits and return on the investment, and to hear a candid performance report by the market development group.

If the product survives this conference, its chances are good, and the next move is semi-works production. Often this may amount to only a stepped-up production in the pilot plant; at other times a versatile semi-works plant may be available.

The material produced at this time may be spread around among a large number of customers in order to get it introduced to as many as possible and make future sales promotion less difficult. Or it may be more desirable to concentrate on one or two customers, and help them work out any problems connected with the use of the product. Our own opinion is that it is better to have one or two customers helping you initiate the product than to have a dozen or more who are having problems with its use.

During this period of semi-works production, the engineering department can gather all the data necessary to design and estimate on a full-scale plant. This is a good time, too, to train potential shift leaders or supervisors for the new plant. The accounting department has by this time got its fingers into the project, and can give an actual cost of semi-works production to compare with the estimates previously made. This period also enables the process development group to iron out any troubles which may have shown up, and also gives them an opportunity to modify or improve the process.

### PLANT DECISION

After a few months or more of semi-works production, the final round table conference is held. The marketing group is now confident that the product can be sold to customers at a certain price. A fairly accurate estimate of annual sales volume can also be formulated at this time. The cost experience of semi-works operation can be interpreted, and the status of technical know-how can be described by the chemical engineering group.

It is a mistake to rush into plant scale production before the chemical engineers are agreed that they know how to operate it successfully. Even at this late stage it may be necessary to throw the whole process back to the development group and tell them to revise it. On the other hand, it is just as bad a mistake to wait until absolutely all the little problems are licked. If we wait for that, our markets may have disappeared, or we will at least have lost one or two years' profits. He who hesitates never gets into business at all.

### ALLOWABLE ERROR

In reviewing the various estimates which are made, we should point out that the original cost estimate may have an accuracy of ± 75% on the capital cost, and ± 25% on processing cost. This accuracy is improved at each stage, so that the second estimate should have an accuracy of ± 40% on capital cost, and ± 15% on processing cost; the third estimate, ± 20% and ± 7%, respectively; the final estimate, ± 10% and ± 3%, respectively.

In concluding, we should point out that the various functional groups which we have mentioned—research, development lab, pilot-plant group, semi-works group, market research, and market development—may in a small organization be concentrated in a staff of three or four men. But regardless of how small or ill-defined the groups may be, the various functions must be performed during the development of a new chemical.

The research and development group is judged by the number of successful projects which it completes. By weeding out "improbables" at as early a stage as possible, waste of time and money is avoided; and economic evaluation is the tool by which this weeding can be accomplished.

## Chemical Growth

(Continued from page 730)

chlorohydrination and hydrolysis.

(b) Acetaldehyde from propane by way of ethylene an ethyl alcohol, or by direct oxidation.

(c) Phenol from benzene by sulfonation or by chlorination.

2. Competition among raw materials to produce same product by same process.
   (a) Phthalic anhydride from naphthalene or from orthoxylene—both by catalytic oxidation.
   (b) Carbon tetrachloride from carbon disulfide or from methane—both by chlorination.
3. Competition among both raw materials and processes to produce some product:
   (a) Ethyl alcohol from ethylene by hydration or from molasses by fermentation.
   (b) Vinyl chloride from ethylene by chlorination and dehydrochlorination or from acetylene by hydrochlorination.
   (c) Adiponitrile from cyclohexane via adipic acid, or from furfural via tetrahydrofuran.
4. Competition among chemically-dissimilar products for the same market.
   (a) Nylon vs. cellulose acetate vs. silk as textiles.
   (b) Phenol-formaldehyde vs. urea-formaldehyde as thermosetting resins.
   (c) Polyvinyl chloride vs. polyethylene as flexible plastics.
   (d) Ethylene glycol vs. methanol vs. ethanol as anti-freezes.
   (e) Alkyl aryl sulfonates vs. alkyl sulfates vs. soap as detergents.
   (f) Ketones vs. esters as lacquer solvents.

### SHORTAGE OF BENZENE AND NAPHTHALENE

One of the most far-reaching conclusions to be drawn from the dynamic growth rate of aromatic chemicals, as exemplified by phenol in Figure 4, is that this rate of growth is rapidly outstripping the supply of benzene and naphthalene from which these chemicals are made. Substantially all of the benzene and naphthalene are produced as byproducts of the steel industry, and their productions are roughly proportional to steel production. The long-term trend curve of steel production shows a gradual up-trend but it is virtually flat by comparison with the dynamic up-trend of aromatic chemicals production.

# NEW SPECIALTY PRODUCTS

*Note: This section limited to new finished specialties. New raw materials and intermediates of interest to specialties manufacturers are described in New Chemical Products department.*

## *Fiber Lubricants* (743A)

**Polyalkylene glycols developed as water-soluble fiber lubricants for wool industry.**

Water-soluble wool fiber lubricants based on the Ucons of Carbide and Carbon Chemicals Division, Union Carbide and Carbon Corp., having undergone two years of laboratory testing, are now being tried out in some commercial mills. These new wool oils were developed as a replacement for the presently-used mineral, animal and vegetable oils which must be dispersed to permit application to the wool, and must be removed before the wool is sold in final form. The new synthetics, compounded especially for this use and containing various inhibitors, are claimed to possess outstanding properties for both the woolen and worsted systems.

In the two-year development program carried on with mill-scale equipment at Lowell Textile Institute, several phases of the problem were investigated to learn which of several hundred available synthetic lubricants are best as wool oils, what quantities are necessary for proper wool processing as compared to conventional oils, and which Ucon lubricant is best for uses on worsted and woolen systems. Ucon textile lubricants H-6, H-15 and L-11 were found to be best from these studies.

Advantages claimed for the new materials are that they require no additives, but are simply mixed with water; can be completely removed with minimum scouring; eliminate back-washing prior to dyeing; eliminate "resists" or uneven results from residual lubricant in subsequent operations such as dyeing and finishing. In addition, the Ucon lubricants are chemically stable, do not become rancid as do some natural oils, are non-staining, non-corrosive and non-toxic.

For worsted processing, Ucon lubricant H-6, used at 1-3 per cent of the fiber weight, gave excellent tops of long fiber length, and good spinning qualities.

For woolen system, H-15, a water-soluble lubricant, and L-11, a water-dispersible type, were reported to be outstanding. Concentration of either type needed was only 2 per cent of the weight of the wool—a 60 to 80 per cent reduction below the amount of conventional oils needed. Ends down in spinning were reduced as much as 90 per cent, indicating greater production, better yarn and higher quality cloth.

## *Metal Hardener Aid* (743B)

**Paste used in selective metal hardening available in more stable form.**

The Isopac Isolating Paste of Denfis Chemical Laboratories is now available in a more stable form. This product is generally used to keep desired sections of metal soft while the rest of a workpiece is case-hardened.

Advantages of the increased stability of the paste are that plants can now buy larger amounts at lower cost and that other shops doing selective hardening only occasionally can keep it in stock ready for use as needed.

The heavy paste is applied before the hardening process is started, and is easily knocked off after quenching. It prevents rapid cooling of protected area when the workpiece is quenched, and is claimed to give excellent results even on high carbon steel. Said not to crack or shrink, it is said to replace copper plating, machining or other time-consuming methods. Isopac can be used with any conventional hardening process like box, salt bath, gas furnace, etc.

## *Thermosetting Coating* (743C)

**Tough plastic coating for wood surfaces is of the phenolic type.**

A new plastic coating for wood surfaces, resistant to chemicals including acetone, but being hard and flexible, has been introduced by U. S. Industrial Chemicals, Inc., under the trade name Aroflint. Containing no drying oils or nitrocellulose, the finish cures through the action of a catalyst which is simply stirred into the product prior to use. A modification of a French product known as Pyrolit, Aroflint gives a finish of the phenolic type that is said to be as quick drying as shellac, and is especially suitable for use on floors because of its resistance to wear, abrasion, rubber burns and water marks.

Although hard (approximately two-thirds as hard as glass and about twice the hardness of conventional furniture finishes) the film formed by the new coating is flexible. When extreme pressure is ex-

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## Equipment Purchasing

(Continued from page 733)

recognize corrosion as a proper operating expense. Fouling rates are likewise logically beyond the equipment supplier's control. Fouling rates may be specified as a basis for comparative calculations but should never be part of performance requirements, particularly if they are included in the form of a penalty clause.

### CONTINGENT DAMAGE

Contingent damage is a subject for lawyers, not chemical men. In large integrated, continuously - operating plants the possible damage and losses, which may result from the failure of an inexpensive piece of equipment, can reach fantastic proportions. No equipment supplier can possibly underwrite such an inordinate risk.

Inclusion of any guarantee clause, which would, in effect constitute a maintenance contract cannot result in an economical purchase.

The foregoing comments have been concerned with the preparation of inquiry-specifications. But brief mention will be made of the quotation-specification (*see box*). It is essential that two sets of specifications be required on each job, buyer's and seller's. Each equipment supplier should be required to specify, in detail, the equipment he proposes to supply. Obviously, no proposition should be considered unless this information is available. Any deviation from this precept can be expensive, yet the writer is familiar with many cases in which such a procedure has not been followed. The result: costly failures or excessive maintenance expense.

### ATTENTION NEEDED

This discussion is the outgrowth of a review of a large number of informal specifications. It is clearly evident that in many, many cases definite savings could have been effected if more attention, more thought, more evaluation had been given to the drafting of inquiries.

Both standard specifications and check lists are valuable, but there is no substitute for careful consideration of the problems of both the purchaser and the supplier.

With the return, at present, to more normal markets and competition, the delays and wastes caused by lazy descriptions and loosely defined requirements are too costly. Most of this waste can be eliminated by the adoption and utilization of sound business procedures so that purchaser and supplier may cooperate to the full and profit from each other's knowledge.



erted with a hard object, the company reports, the wood may be dented but the film remains unbroken.

Because Aroflint is pale in color, it can be used for treating natural woods, and exposure tests have demonstrated its color retentive qualities. It also formulates well with pigments, making possible the preparation of colored enamels from it.

The material is now being marketed through paint and varnish manufacturers for use on furniture for home, office, restaurant and store furnishings and the like. It is also recommended for sporting goods, industrial equipment, and marine work, especially so-called "bright work" on ships and yachts, on hulls and interiors of speed boats, dinghys and similar craft.

## *Intravenous Terramycin* (744A)

**Injectable form of terramycin now available from Chas. Pfizer & Co.**

"Terramycin Intravenous" is the name under which an injectable form of terramycin will be made available to the medical profession by Chas. Pfizer & Co., Inc., sole producer of the new drug. It will be especially valuable where immediate therapeutic action is essential, and will be useful for patients who can't take the customary forms of oral antibiotic medication.

Outstanding uses envisioned for the new form are treatment of peritonitis and prophylactic sterilization of the intestine before and after abdominal surgery. Terramycin Intravenous is available in two package sizes: 250 mg. or 500 mg. of sterile crystalline terramycin hydrochloride.

## *Rodenticide* (744B)

**Warfarin is active ingredient in new rat and mouse killer.**

Michigan Chemical Corp. marks its entry into the rodenticide field with a rat and mouse killer based on the new rodenticide warfarin, formerly known as Compound No. 42. Its product is called Ratmaster.

Ratmaster is packed in ½-pound packages, 12 to the case, and in 50-pound bulk packages for the pest control industry and other commercial users. A half-pound makes ten pounds of prepared bait, which may be of corn meal, meat scraps, or other suitable dry food.

Warfarin is the discovery of Karl Paul Link and his associates at the University of Wisconsin. It kills rodents by causing them to suffer from fatal internal hemorrhages. They cannot taste the material at the concentrations used and do not become bait-shy. Pre-baiting techniques are unnecessary. The new rodenticide has been tested and approved by the U. S. Fish and Wildlife Service, the U. S. Public Health Service and the U. S. Department of Agriculture.

## *Glass Patching Cement* (744C)

**Cement for patching glass-lined vessels is corrosion resistant, withstands alternate heating and cooling.**

A patch that loosens only under very severe test is claimed to be possible with Carbo-Fix 6050, a new corrosion - resistant cement for patching glass-lined vessels subjected to heating and cooling cycles. It is the development of Carboline Co. The effectiveness of the material is attributed to a coefficient of expansion very close to the basic materials patched. It is the successor to a material placed on the market about five years ago under the name Carbo-Fix.

Before application, three materials are mixed together. Exposed steel must be primed but rough glass need not. Although the patch dries at room temperature, an infrared lamp can be used to accelerate drying.

In laboratory tests, patches were placed in an oven at a temperature of 300°F. for half an hour, then water quenched. Patches lasted from 20 to 32 cycles before loosening. This is 5 to 9 times as long as other glass lining cements tested, the company reports, including the original Carbo-Fix. Such tests exceed normal reaction vessel conditions, point to good service without need for plugs and plates or gaskets in anchoring patches.

## *Glycerine Substitute* (744D)

**Product available in tonnage quantities can replace glycerine in many applications.**

Aquaresin (Glycol Bori-Borate) is the name of a synthetic product that Glyco Products Co., Inc., is producing on a tonnage basis and is offering as a replacement to glycerine users who may have difficulties getting sufficient supplies of that short material. It is an odorless, viscous, colorless, non-drying, hygroscopic liquid. The pH of its 5% aqueous dispersion is 8-8.4; its specific gravity, 1.37. It is completely soluble in water, methanol, glycerine and the glycols. It is insoluble in oils and hydrocarbons. It is non-flammable and not subject to bacterial or enzymic decomposition.

This material is being used as a softener and plasticizer for glue, gelatin and water-soluble gums. It is also used as a softener and plasticizer in textile and paper manufacture. It is non-toxic but is not to be taken internally. It is not suitable as an anti-freeze.

(*Turn to page 754*)

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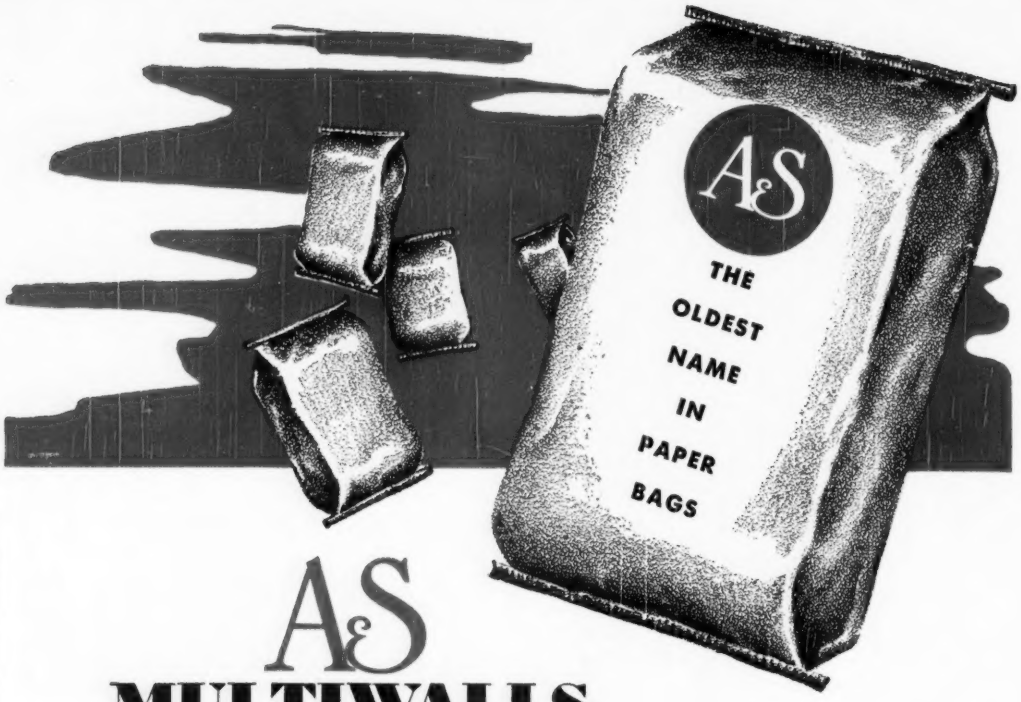


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## PEOPLE

MAX LUTHY, elected vice president of production and research for The Givaudan Corp.

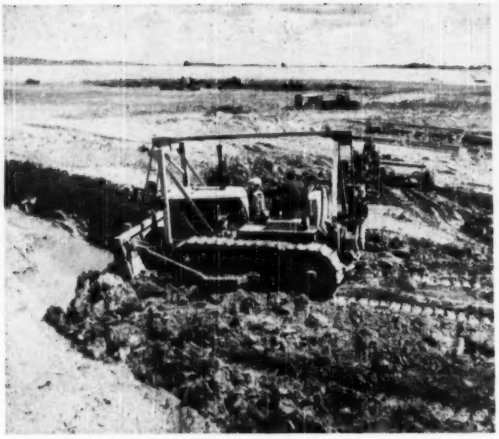
H. SOKOL, recently appointed manager of antibiotics research for Heyden Chemical Co.

CHESTER M. BROWN, named vice president, General Chemical Div., Allied Chemical & Dye.

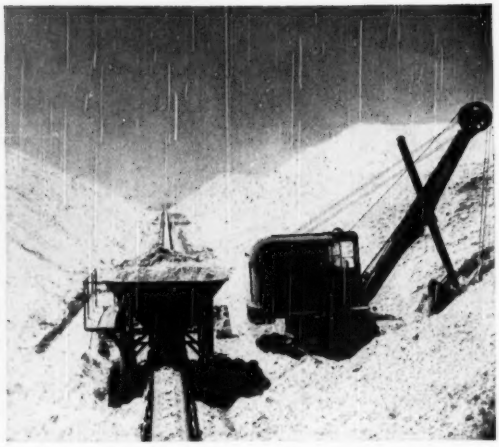
RICHARD S. EGLY, appointed director of research for Commercial Solvents Corp., at Terre Haute, Indiana. He was previously in charge of chemical engineering research.

FELIX N. WILLIAMS, named coordinator of sales for Monsanto Chemical Co. He was vice president and general manager, Plastics Div.

JOHN R. RILEY, Jr., elected vice president in charge of sales for the Spencer Chemical Co. He was formerly general sales manager.



BULLDOZER levels floor of outdoor drying reservoir. Autumn coolness precipitates sodium sulfate from brine pumped in during summer.

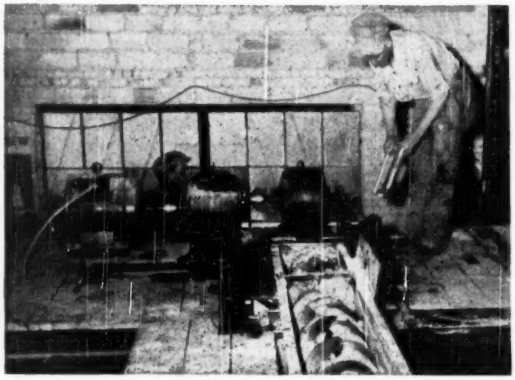


CRANE hoists scoopfuls of precipitated salt cake into flat car. It is then taken to plant for further drying in gas-fired evaporators.

# NORTH OF THE BORDER

**Province of Saskatchewan mines 150,000 tons a year of sodium sulfate, much of which is exported to the U. S.**

WORLD'S largest exploitable deposits of sodium sulfate are found in the semi-arid regions of the Province of Saskatchewan, centering around the town of Chaplin. Extent of the entire deposit is estimated at 150 million tons; and the newest and largest of the six plants operating in the area—that of the province-owned company, Saskatchewan Minerals—is designed to recover 150,000 tons a year. Operation of the plant has been described (*Chem. Eng.*, Dec. 1948, p. 121), but photographs made available this month reveal better than words the size of the installation.



WORKMAN stands by screw conveyor mechanism which lifts dry and pure salt cake into large bins, where it is stored before shipment.

OUTSIDE VIEW of plant shows the two huge storage bins at the right of the main building. Each is 40' in diameter and 40' high. Product from the bins is of particularly high quality—98½ to 99½% pure. Major markets are the U. S.'s kraft paper and detergent industries.

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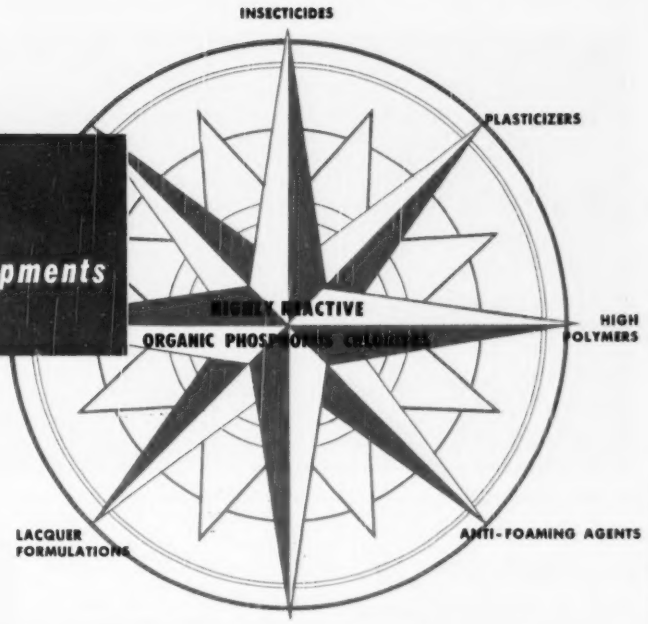


# 3 IMPORTANT INTERMEDIATES NOW AVAILABLE IN COMMERCIAL QUANTITIES

The commercial availability of this group of organic phosphorus chlorides will be of special interest to research chemists. Already these three chemicals have proved useful as intermediates in organic synthesis for applications in insecticides, plasticizers, high polymers, lacquer formulations, anti-foaming agents, and others.

Victor organic phosphorus chlorides may prove successful in one of your research projects. It will pay you to explore their possibilities! Additional information on Victor organic phosphorus chlorides and their derivatives, as well as experimental samples are available. Check and clip the coupon to your letterhead or write:

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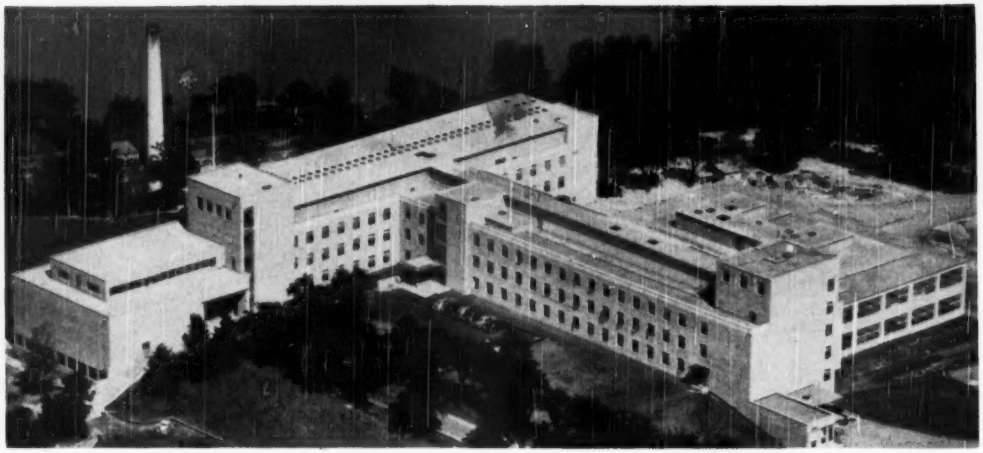


GENERAL ELECTRIC'S new laboratory, built on a former private estate called the Knolls, is about 5 miles from the main G-E plant.

# G-E COMPLETES LAB

**New wing of General Electric laboratory houses chemical division.**

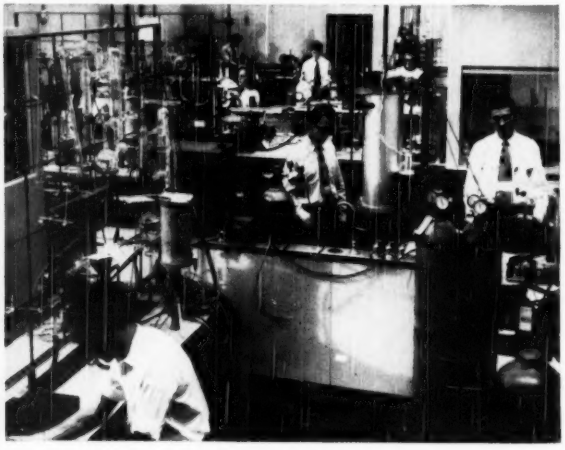
GENERAL ELECTRIC CO. has completed its new research laboratory at Schenectady, built about 5 miles from its main plant. The first section was finished and opened in the autumn of 1948. The newly completed wing houses the chemistry division, the X-ray division, part of the metallurgy division, the library and several others.

Exclusive of minor service buildings, the laboratory plant totals 5 buildings with a usable area of about 185,000 square feet. This includes the main five-story building, a low-temperature lab where helium is liquefied for studying effects at temperatures near absolute zero, and a chemical pilot plant.

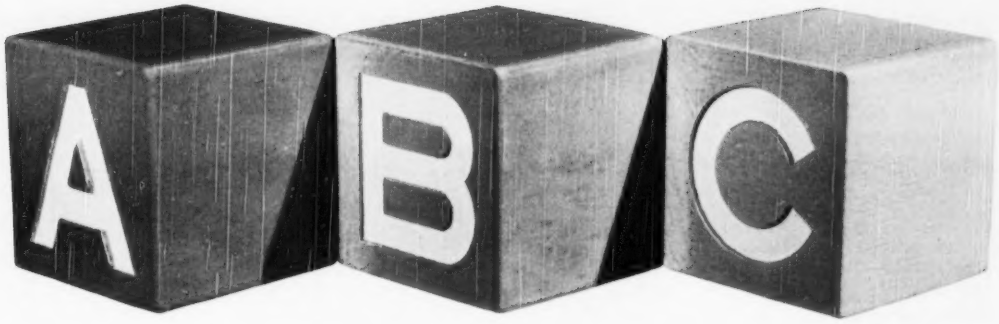
Since the problems and methods of research work are constantly changing, it was decided that most of the new lab would provide "universal space," flexibility of building layout. The basic keys to this are ready availability of the many services required for research and the use of movable steel partitions. A series of vertical shafts at 12-foot intervals on both sides of the halls provides such services as electricity, oxygen, hydrogen, nitrogen, gas, air, etc.

PHOSPHOR-COATED glass plate is examined. It is made to glow by the rays from an ultra-violet lamp.

MINIATURE SNOWSTORM is produced in a home freezer. G-E scientists have several ways of making rain and snow.



TYPICAL laboratory room at the new lab. Work in foreground concerns surface properties of metals; in middle, heat capacities; and in back, changes in structure.




# "Building Blocks" for sale

Not for your youngster but for you are these chemical building blocks —specifically, olefins and paraffins. These chemicals are intermediates in the production of many chemicals including alkyl phenols, alkyl mercaptans, alcohols, and halogenated products. If you presently produce or are doing research work with any of these end products, you should be interested in Atlantic's materials.

**Diisobutylene** Approximate composition of 80 weight percent 2,4,4-trimethylpentene-1 and 20 weight percent 2,4,4-trimethylpentene-2. Recent improvements in processing techniques have narrowed the boiling range to 101.8 to 105.0° C. Available in drums and tank cars.

**Triisobutylene** Principal components consisting of 2,4,4,6,6-pentamethylheptene-1; 2,4,4,6,6-pentamethylheptene-2; 2,2,4,6,6-pentamethylheptene-3; 2-neopentyl-4,4-dimethylpentene-1. Available in drums and tank cars.

**Ultrax 20** Water white mixture of predominately straight chain paraffin hydrocarbons averaging 20 carbon atoms per molecule. Available in drums and tank cars.

In addition to these commercially available olefins, experimental quantities of hexenes and nonenes can be supplied for research work. We'll be glad to send you our Technical Bulletin giving further information on these Atlantic products. The Atlantic Refining Company, Chemical Products Section, 260 S. Broad St., Philadelphia 1, Pa.

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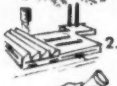

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3. **Research facilities**

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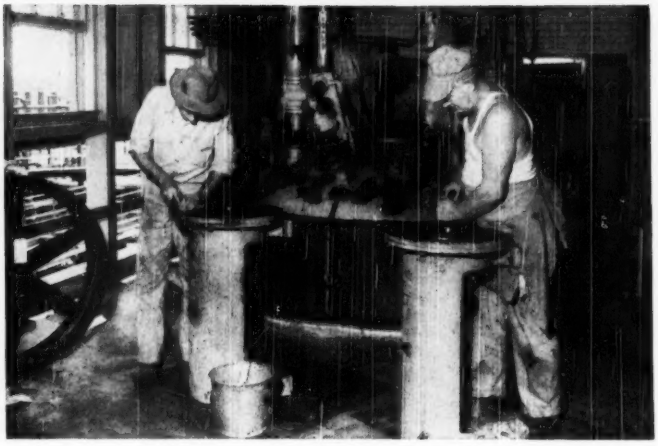


DURASEAL units on reactors get cleaning and reconditioning in Port Neches stand-by synthetic rubber plant now reactivated by U. S. Rubber for Office of Rubber Reserve.

## HISTORY REPEATS

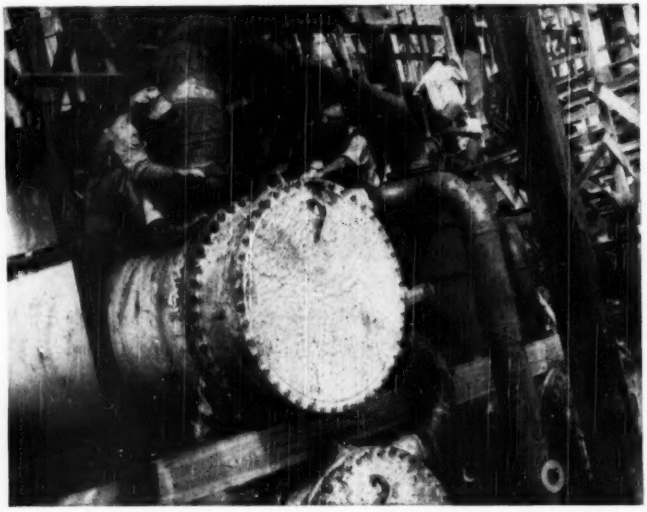
**Port Neches GR-S plant reactivated as Administration prepares for defense needs.**

FIRST synthetic GR-S rubber plant to be reactivated under the government's new program started production 20 days ahead of schedule. Designed with a production capacity of 60,000 long tons a year, the Port Neches, Texas, plant has been thoroughly modernized by U. S. Rubber Co. engineers so that it will produce more than 72,000 long tons a year when operating at load peak.

Production this month, up from October's 1,500 long tons, will increase gradually until peak capacity of 6,000 long tons per month is reached by December 1.

Reactivation and modernization were accomplished in less than three months at a cost of $1,030,000. Of this total $530,000 was utilized for modernization and $500,000 for reactivation.

The plant, representing a capital investment of more than $11 million, was built in December, 1943, and has been in standby since September, 1947.



SIMPLIFIED 18-inch vapor line is installed on top of styrene condenser. Improvements such as this boost plant capacity from 60,000 long tons to more than 72,000 annually.

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**Distilled Coconut Fatty Acid**—Minimum low fractions—ideal for liquid and paste soaps, synthetic detergents, shampoos, cosmetics, as well as rubber softening agents, fatliquors, etc.

**AB Fractionated Double Distilled Coconut Fatty Acid**—Stabilized to prevent discoloration—minimum of low fractions. Ideal for soaps, shampoos, shaving creams, plasticizers, stabilizers, alkyd resins.

**ABH Hydrogenated Coconut Fatty Acid**—Iodine value less than 2.0%—greater stability, longer shelf life. Ideal for soaps, synthetic detergents, shaving creams, cosmetics.

**Formula 300 Distilled Stearic Acid**—Exceptional color—mildest odor—highly stable. Ideal for hand lotions, deodorants, shaving creams, cold creams, cosmetics.

**WELCOLINE OO Double Distilled Oleic Fatty Acid**—Premium grade of Oleic Acid—low titre—high stability. Ideal for synthetic detergents, drycleaning soap, textile softeners, leather penetrants, plasticizers, emulsions.

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**CHEMICAL SPECIALTIES**—

*(Continued from page 744)*

Aquaresin is available in 55-gal. drums at 30¢ a pound, f.o.b., Natrium, W. Va.

### *Metal Finish* *(754A)*

**Vinyl finish for coating metal trim and hardware is fast-drying.**

Base VC-38 is the name of the clear, fast-drying vinyl finish developed by United Lacquer Manufacturing Corp. for use on trim and hardware made of brass and other metals, including iron, copper, gold, cadmium, chromium and nickel. It may be tinted to give a gold or brass appearance to steel or aluminum. It is particularly useful in finishing door knobs, truck locks, handles, and metal trim.

Chief advantage claimed for the new product is its fast drying time—it air dries sufficiently for handling in a half-hour, air dries hard overnight. It will dry hard in 10 minutes if baked 10 minutes at 200-250°F. in a gas oven or under infrared lights.

Good adhesion, excellent hiding and flowing qualities are claimed for Base VC-38. Applicable by dip or spray, it is available in a satin or flat finish. A special thinner, Base VT-39, has been prepared for use with the product.

### *Anti-Freeze* *(754B)*

**Methanol-type anti-freeze Monsanto's first retail product in New England.**

Monsanto Chemical Co. is introducing under its Eskimo trademark its first retail product in New England. This is a methanol-type antifreeze which is being produced in New England by the company for exclusive distribution in New England. It will be promoted by newspaper, magazine, television and radio advertising in that area.

### *Casting Resin* *(754C)*

**Phenolic resin for production or duplication of tools and models is non-shrinking.**

A new liquid phenolic casting resin called "8000" Tool-Plastic is being manufactured by Durez Plastics & Chemcials, Inc., for Rezolin, Inc., distributor. The new product is claimed to eliminate the shrinkage encountered with other materials of this type.

The company claims that economical production or duplication of tools and models of high dimensional stability is possible without elaborate shop equipment and excessive skilled personnel. It says that savings of 50 per cent in time and cost of production of checking fixtures, hydropress and stretch-press dies, jig bases, master models, acrylic form dies, polyester laminating molds, spinning chucks and the like are possible.

An accelerator paste is always used with "8000" Tool-Plastics. Two types are available: the "8000" Paste and the "Quick-Set" Paste. No fillers are required. The mixture of resin and "Quick-Set" Paste sets up immediately at room temperature, and is used for repair work or emergency production. The standard mixture cures overnight at 190°F. No pressure is required.

The finished part is infusible and insoluble; has an impact strength of 0.24 to 0.3; a specific gravity of 1.26.

### *Protective Coating* *(754D)*

**New coating based on Vinylite resins is resistant, long-lasting.**

Superior protection, durability, economy and distinctive beauty are the advantages claimed for Beauty-Shield, a new protective coating for both interior and exterior use that is being distributed by Plastic Coating Corp. Based on Vinylite resins, it is said to clean easily, withstand repeated washing and be resistant to fumes and to most acids and alkalis.

It is available in flat, semi-lustre and gloss finishes, in range of colors, in one gal. or five gal. containers. Applied with conventional spray equipment, it dries in five to ten minutes and requires little thinning. Two coats hide most surfaces. It can be applied over old paint, and blends very well in touch-up jobs. Cost of the coating is about the same as high grade enamel, with speed of application reducing labor costs. Its durability is said to make repainting necessary at less frequent intervals.

### *Shampoos and Bases* *(754E)*

**Series of new shampoos and base formulations developed.**

Raymond C. Crippen Research and Development Laboratories has developed a new series of shampoos and base formulations containing lanolin and water conditioning aids. The new materials are clear, near neutral, light in color and almost odorless unperfumed. They are available either as concentrates or formulations custom compounded.

### *Home Silverplater* *(754F)*

**Silverplating at home made possible by retail specialty.**

Quadruple Silvaplate is the name of a new household specialty product being sold by Silvaplate Corp. to enable a housewife to replate her own silver in her home. The material, claimed to contain pure silver in liquid form, is simply rubbed with a cloth onto the article to be

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When you are presented with an ISCO business card, you can be certain that the representative means business—business for you, that is.

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| For All Purposes | Liquid FC 45% |
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| Crushed—Broken 90% | iron—for use where spe- |
| Liquid FF—45-50% | cial purity is required. |

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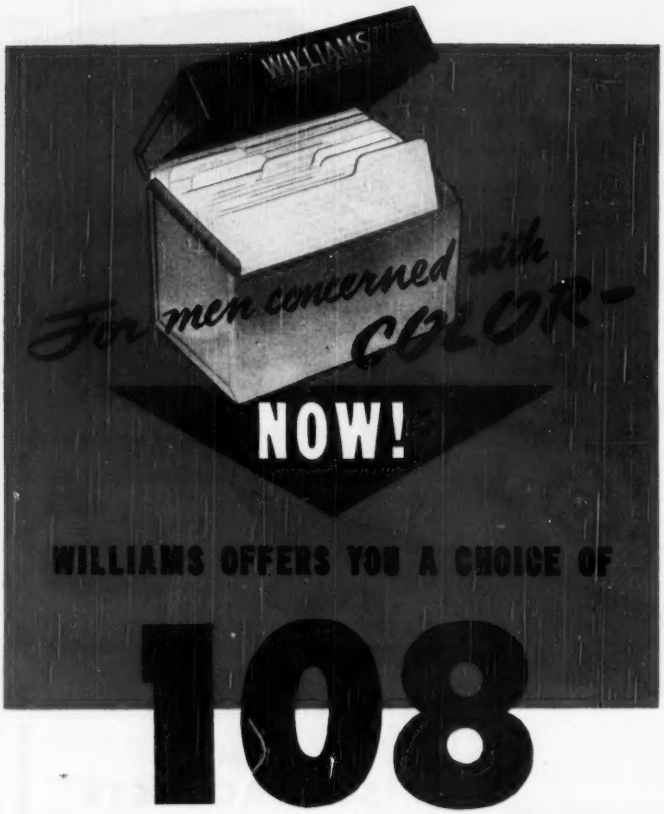
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replated. The job is said to be completed in less than five minutes. In addition to worn silverware, any article having a copper, brass, bronze or nickel-silver base or having a worn chromium finish can be silverplated.

An 8-oz. bottle (containing a dozen application cloths) sells for $7 while a 4-oz. trial size sells for $4. It is being sold through hardware and department stores and directly by mail from the company.

### *Fluorescent Decals* (*756A*)

**Decals with fluorescent colors developed for indoor displays.**

Decal indoor display signs said to be four times brighter than ordinary types have been introduced by Palm, Fechteler & Co. Based on fluorescent inks, they are available in fire orange, neon red, arc yellow, saturn yellow, and signal green. If not exposed to the rays of the sun, the decals are claimed to fluoresce for over six months. The new display signs are being promoted for showcases, coolers, walls, backbars and mirrors.

• A **new form of penicillin,** called Distaquaine, has been introduced by a subsidiary of Distillers Limited of England. It is being produced in its new plant near Liverpool. The new drug is painless when administered and one injection lasts for 24 hours.

Supplies of Distaquaine have recently been sent by air to Melbourne, Sydney and Karachi and to the British forces serving in Korea. (*756B*)

• A new compound, found in preliminary trials to be of value to many patients in **treatment of edema and dropsy,** has been developed at the Sterling-Winthrop Research Institute. So far known only by its laboratory number WIN 3000, the compound is an outgrowth of research on ion exchange. The resins, swallowed before meals, remove sodium from salted foods. Too much sodium in the body leads to watery swelling or dropsy. (*756C*)

• Campho-Phenique Powder and Campho-Phenique Liquid, **antiseptics,** are now being distributed by the Centaur-Caldwell Division, Sterling Drug, Inc., in new packages.

Biggest change is in the powder for which a tin container is now used, replacing a bottle and carton. The tin container holds two ounces, retails for 60 cents and is fair traded at 54 cents, whereas there were formerly two bottle sizes. Furthermore, labels on the new tin describe the powder as antiseptic and

fungistatic, and for the first time directions are given for its use for athlete's foot as well as for dry dressing.

Color scheme of both new packages is cream over-printed with green and red. The old packages used yellow, red and black, with the name in yellow on a black reversed plate. *(757A)*

• Naugahyde is the name of a **new type of vinyl plastic** forming an elastic upholstery material, with a high slip finish, that has been developed by U. S. Rubber Co. for use in automobiles, buses, trucks and furniture. It will stretch in every direction, is easy to tailor and stays permanently soft and pliable. It combines a special elastic supporting fabric and an elastic coating. Service tested for almost two years, the product has been adopted by leading car manufacturers for upholstering 1951 passenger cars and convertibles, it is also being used by furniture manufacturers for upholstered pieces heretofore difficult to tailor. *(757B)*

• Plas-Stik is the name of a new **display sticker** that adheres to glass, and enameled, glossy, painted or metal surfaces without the use of an adhesive. Product of the Decal Plas-Stik Co., it is a vinyl film cast from B. F. Goodrich Chemical Co.'s Geon paste. An advertiser's name, slogan, etc., is printed in multicolors by the silk screen process on Plas-Stik, which can be cast in thickness from 3 to 10 mils, or heavier if desired, and cut in a variety of shapes. *(757C)*

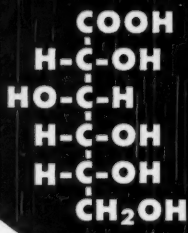
• **Radiacwash, a solution for cleaning surfaces contaminated by radioactivity,** is the product of Atomlab, 489 5th Ave., N. Y. Demonstrated recently at New York City College, Radiacwash has been observed to lower the MR count (milliroentgens) on treated objects. The liquid is said to act as a combination detergent, emusifier, solvent, ion-extractor, etc. It does not neutralize radioactivity, or the physiological effects of radiation, but assists in lifting-up contamination prior to penetration. *(757D)*

• Pentresamide tablets, a **combination of potassium penicillin G with sulfamerazine, sulfadiazine and sulfamethazine,** have been nationally released by Sharp & Dohme, Inc., Philadelphia.

Designed for simultaneous treatment of infections where oral administration of penicillin and the sulfonamides is indicated. Pentresamide is effective against a wider range of organisms than either sulfonamides or penicillin alone. *(757E)*

# *IF YOU...* Need a Mild, Poly-hydroxy Mono-carboxylic Acid

## SPECIFY PFIZER GLUCONIC ACID




### PROPERTIES and USES

Molecular Weight—196.16

Appearance—Yellowish liquid

Specific Gravity of Solution @ 25°C —1.24

Solubility in Organic Solvents—Low

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Leather dyeing
Acidizing oil wells
Catalyst for Melamine resins

A metal cleaner with a low corrosion rate for—
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Pickling baths
Acidic type cleaners

Easily assimilated for—
Food and Pharmaceutical Use

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# SPECIALTIES NEWS

### *State Upholds Fair Trade In War Surplus Resales*

In California, a manufacturer can force a retailer to charge the fair trade price for his merchandise even though it has been obtained as war surplus from the War Assets Administration. Furthermore, the manufacturer can obtain an injunction to prevent further price-cutting on a broad list of fair trade commodities even though a violation of fair trade laws has been proved with respect to one when the threat of violations in the future "is indicated because of their similarity or relation to the unlawful acts found to have been committed"

This is an unanimous decision of the District Court of Appeal of California in upholding a decision of that state's Superior Court in which an injunction was granted to restrain a San Francisco cut rate store from selling Dr. Lyon's Tooth Powder below the price established by Sterling Drug, Inc., in its fair trade contracts in California. The defense claimed that the merchandise was war surplus and that it therefore did not come under the fair trade laws. The court held this defense invalid. Moreover, since it was shown that the retailer was advertising the material "to be 100% in perfect condition," it was held that an exemption from fair trade prices, permitted when goods are deteriorated in quality or damaged, did not apply in this case.

### *Detergent Reduces Etching Of Bottles by Caustic*

Recently completed laboratory tests conducted by The Solvay Process Division, Allied Chemical & Dye Corp., with its synthetic detergent Nytron showed that it possesses the unique property of reducing substantially corrosive attack of straight caustic soda solutions on glass surfaces. Primary purpose of the work was a means of reducing corrosion of bottles in machine washing, which aggravates the familiar "scuffing" problem of the bottling industry. However, results indicate a possible wider field of benefit in reducing corrosion wherever glass or ceramic surfaces are in contact with alkaline solutions.

Representative tests showed weight loss of typical Coca-Cola bottles due to caustic soda attack about 14 times less with Nytron in the caustic solution. Weight loss due to corrosion of glass microscope slides was reduced about 210 times compared to weight loss of test slides in a caustic solution not containing Nytron. Maximum inhibition of caustic soda attack on bottles was obtained with small quantities of Nytron, 0.10 to 0.25%, in a 2% caustic soda solution. Agitation of the solution prolonged the inhibiting action of Nytron, which averaged two weeks in duration.

A 26-page report giving complete details on the research project can be had without charge upon request to the company.

### *Antibiotic Gives Promise As Rat Repellent*

Experiments at the Army Medical Service Research and Graduate School, Washington, D. C., indicate that an antibiotic, actidione, may be of value as a rat repellent.

The work was recently reported on by Major Robert Traub and Miss Doris Newman of the Army medical school, and James B. Dewitt and Jack F. Welch of the Interior Department's Fish and Wildlife Service.

First identified by the Upjohn research laboratory early in 1947, the substance was subjected to tests at the Army Medical Center to determine its efficacy, if any, in parasitic infections. During these experiments, it was noticed that the laboratory mice and rats would rather die of thirst than drink water containing even minute quantities of actidione. This led to a separate line of investigation which resulted in finding that rats will not gnaw through thin cardboard treated with tiny amounts of actidione.

Although still expensive to produce since it is a by-product of streptomycin, actidione may eventually be available at a price that would permit its use in inexpensive forms as a protective coating or impregnant for packaging. This would be of tremendous value in reducing losses currently caused by rodents.

Other uses envisioned for actidione are as a protectant for fruit trees and electric wire that are attacked by gnawing field mice; deer repellent (deer won't chew tree bark treated with actidione solution); and as a fungicide in controlling plant diseases.

### *Kolker Begins BHC Production*

Commercial production of benzene hexachloride has just begun at the new Houston, Texas, plant of Kolker Chemical Works, Inc., Newark, N. J. The technical product will have a gamma content of 36% as compared with the common technical BHC which runs 12-14% gamma isomer.

Kolker centered its BHC production at Houston because of available raw materials and markets for the finished product. The insecticide is very effective on cotton pests, and when used in combination with DDT, offers a complete insect control program.

***William R. Johnston, named vice president in charge of research, Standard Brands, Inc. He was formerly director of research.***

### *Prentiss Changes Name, Consolidates Operations*

R. J. Prentiss & Co., Inc., New York, N. Y., manufacturer and distributor of chemicals, botanicals, insecticides and rodenticides, has changed its corporate name to Prentiss Drug & Chemical Co., Inc. This is merely a change in name and does not involve any change in business policy, management or personnel.

Coincident with the name change is a move of the company insecticide plant to new and larger quarters. Formerly located in Newark, N. J., the insecticide manufacturing division is now in a building adjacent to the present Prentiss chemical and botanical processing plant at 261 King St., Brooklyn. The move consolidates all manufacturing operations at the Brooklyn address.

### *Shell-Hyman Relations Clarified*

The working relations between Shell Chemical Corp. and Julius Hyman & Co. have been outlined in a recent joint statement supplementing the announcement made last June that Shell is the exclusive agent for domestic sale of unformulated aldrin and dieldrin which Hyman makes. The two companies are to collaborate closely in all matters of common interest, including

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Girard P Reagent (Acethydrazide Pyridinium Chloride)
Girard T Reagent (Trimethylacethydrazide Ammonium Chloride)
Gitoxin
Gliadin
Glucamine
Glucoascorbic Acid
Glucochloral
Gluconic Acid
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Glucose Pentaacetate
Glucose-1-Phosphate (Di Potasium Salt)
Glucose-6-Phosphate (Barium Salt)
Glucosides
Glucuronic Acid d(+)
Glutamic Acid, l(+), natural
Glutamic Acid, d(—), unnatural
Glutamic Acid, dl
Glutamic Acid Hydrochloride, l(+)
Glutamine, l(+)
Glutaric Acid
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Glyceraldehyde-3-Phosphate (Calcium Salt)
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Glycerol Esters
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Glyceryl Monostearate
Glyceryl Tricrotonate
Glyceryl Trilaurate
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Glycidyl Isopropyl Ether
Glycine
Glycine Anhydride
Glycine Ethyl Ester Hydrochloride
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sales development and promotion. Although departments common to both companies remain intact, they will be coordinated so that each performs as far as possible complementary functions. Under the working agreement all ten Shell district offices are available to service aldrin and dieldrin accounts.

Shell Agricultural Research Laboratory, Modesto, Cal., carries out cooperative research studies with Y. P. Sun, director of Hyman's bioassay laboratory in Denver. The Hyman company will continue major basic research on the two products, and problems of a technical nature are referred to its sales service laboratory. Residue studies are being carried on concurrently by both organizations, as is research in development of new products.

### *Charcoal Used with Parathion on Apples*

Addition of activated charcoal to parathion sprays gives promise of reducing adverse effects when this insecticide is used on apples. This is the indication of early experiments at the New York Agricultural Experiment Station, Geneva, N. Y., where damage to apple foliage and fruit caused by use of parathion on McIntosh and related varieties is under investigation.

Injury to actively growing tissue and exposed leaves is most apparent early in the season, even at dosages too low for insect control. Leaves which appear after the spray has been applied develop normally, however. Injured leaves show a burning, while sunken dark spots appear on the fruit. These spots, apparently caused by heavy deposits of insecticide left by droplets of spray, become less noticeable by harvest time.

Three or four parts of activated charcoal to one part of parathion, which has been universally acclaimed as an effective insect killer, may counteract any of its detrimental effects. Before recommendations can be made, further tests must check whether there are possible secondary effects from the charcoal.

### *Paraffine Adopts Trade Name for Company Name*

The Paraffine Companies, Inc., San Francisco, Cal., has changed its name to Pabco Products, Inc. This is just a name change and there will be no change in the management or policies of the company.

Reason for the change is that the trade name "Pabco" has been used for about 50 years to identify company products and that expenditures aggregating millions of dollars have been made to connect the name with quality and service. Since there has been no such direct identification or connection between the name "Paraffine" and the company's manufactured products, the company wished to take advantage of the already established name that would enable customers to identify the company with its products and activities.

### *"What's New" Memo*

Do you make resin emulsion-based adhesives, paints, textile finishes, leather finishes, paper coatings and impregnants? Synthetic detergents? Industrial finishes, floor coatings? Are you concerned with consumer acceptability of such products as cosmetics, floor polishes and soap? Do you use odorants in your formulations?

For the latest on these subjects, you'll want to read the following articles in this issue:


**"Resins Go the Water Route,"** p. 713.
**"Flakes Without Ions,"** p. 714.
**"Glycerine Dividend,"** p. 717.
**"Human Analyzers,"** p. 721.
**"Seven Up,"** p. 722.
**"Flavor Front,"** p. 723.


### *Perkins Glue Building New Facilities*

High Point, N. C., center of a highly productive furniture and plywood area, is the site of a new plant being built by Perkins Glue Co. At present the main building will consist of 7500 square feet of warehouse and office space, but there are provisions for manufacturing at a later date. The company's complete line will be handled at the new location, with facilities provided for both bulk and container shipments. Construction is under the supervision of J. B. B. Stryker, Jr., company vice president.

### *Aerosols, G-11 Soaps on Cosmetic Chemists Program*

Among technical papers of interest to specialties manufacturers to be presented at the Society of Cosmetic Chemists' meeting at the Biltmore Hotel, New York City, December 5, 1950, are pressure packaging of cosmetic products by W. E. Graham, research director of Crown Can Co. and a description of a test method for determining the germicidal efficiency of hexachlorophene soaps by Arthur R. Cade, Sindar Corp. (G-11 is Sindar's trade name for hexachlorophene.) In addition there will be papers on subjects

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### Note these 8 big special features!

1. **Economical**—Lower tare weight for each 10 pounds of acid purchased.
2. **Stronger . . . Safer**—Bottle molded of shatter-proof plastic. Won't develop dangerous leaks common to lead containers.
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4. **Easier to handle**—Convenient size and light weight insure ease of lifting and pouring.
5. **Easier to open**—Screw-type plastic cap makes reclosure easy; safeguards against spillage . . . leakage; protects purity. Compare with hard-to-remove rubber stopper on lead container.
6. **Easier to pour**—Special bottle design and pouring lip insure clean, accurate dispensing.
7. **Acid resistant**—Entire unit made of polyethylene: highly resistant to aqueous HF, other acids.
8. **Acid level always visible**—Translucent plastic eliminates guesswork or measuring sticks.

**PACKING: Four bottles call-packed in standard returnable wooden shipping case . . . easy to handle . . . easy to store . . . easy to return. Single bottles available in sturdy wire-bound box.**

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* Complete stocks are carried here.

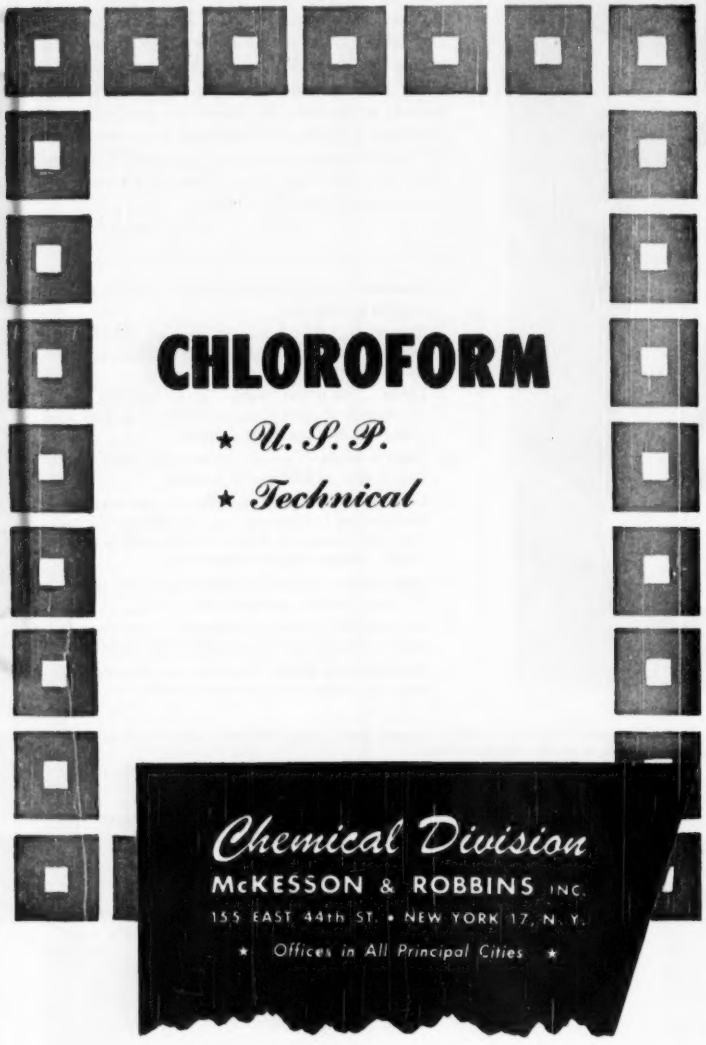
dealing with the hair and on current literature sources for the cosmetic industry.

### *Methanol Anti-Freeze O.K. For Most, Says Du Pont*

The Du Pont Co., which produces both permanent (ethylene glycol) and non-permanent (methanol) anti-freeze, the latter selling for about one-third the price of the former, reports that four out of five cars now on the road can get adequate cold-weather protection with the less expensive product. This is based on the company's research on anti-freeze dating back to 1933 and covering all types. Premium-priced anti-freeze is said to be required only under the following conditions:

1. In those autos in which high-opening thermostats have been installed to get more heat out of heaters.
2. Cars driven in those sections of the country where it gets colder than 30° below zero.
3. Automobiles operated at high altitudes.

From Du Pont's tests, losses of anti-freeze were found to result largely from leaks and after-boil and not from evaporation. The work also showed that cars with thermostats opening in the 140-160°F. range, as are the vast majority of autos on the road today, received satisfactory protection with the standard-priced anti-freeze without warm weather boiling except under very severe operating conditions, or in areas such as in Montana and the Dakotas, where extremes of temperature from 120° above zero to 45° below may be encountered during the anti-freeze season.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### *Wax Importers Elect Officers*

The American Wax Importers and Refiners Association, Inc., at its third annual meeting held recently elected the following officers and directors for the ensuing year: president, George S. Hamilton, Innis, Speiden & Co.; vice-president, Charles S. Bullock, Strahl & Pitsch, Inc.; secretary, John J. Garvey, Mamaroneck Chemical Corp.; treasurer, Edward Schumacker, F. W. Steadman Co.; directors, Andrew J. Bohart, Stein, Hall & Co.; J. L. de Lyra, Wessel, Duval & Co.; R. E. Sievert, The Frank B. Ross Co.; and Charles Bullock, Strahl & Pitsch, Inc.

Mr. Bohart, retiring president, reported that the association's research project on crude carnauba wax had been completed during the past year at New York University, and the findings are available from the organization in a booklet entitled "A Critical Study of Certain Properties of Carnauba Wax."

### *Laundries Big Market*

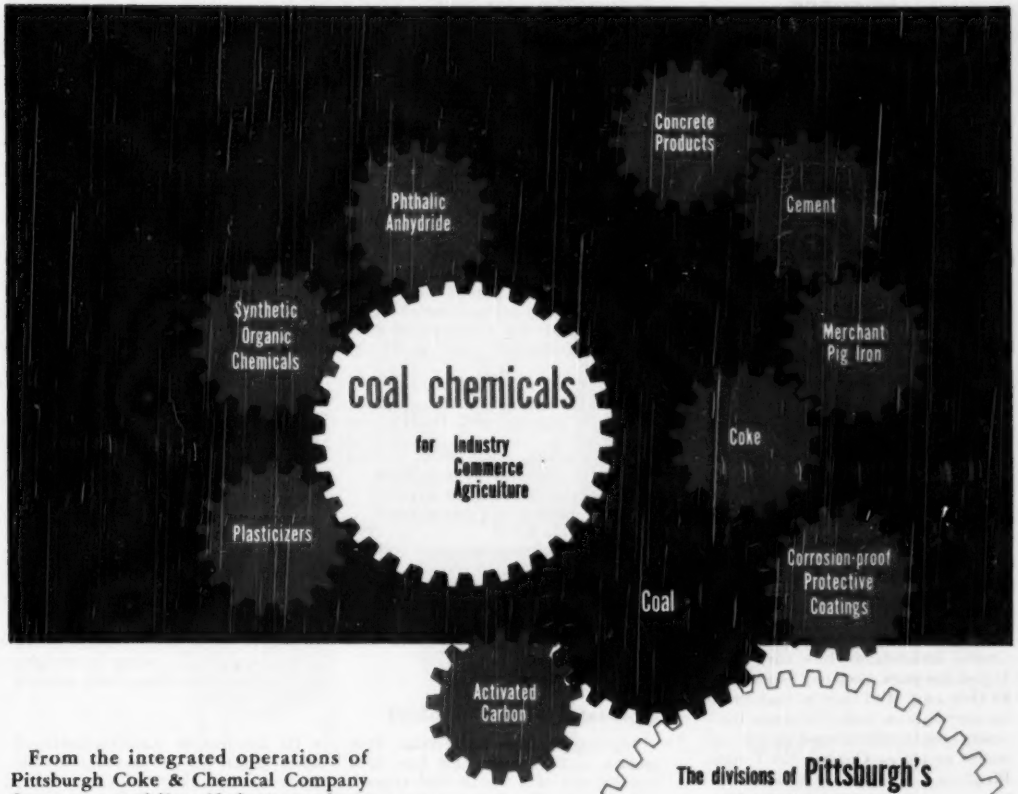
The laundries in the United States last year purchased almost $30 million worth of washing supplies. These were principally soap and detergents. This figure was obtained by the American Institute of Laundering in a survey in which 677 plants participated.

### *Fertilizer Figures in USSR Barter Deal*

An important offer for the barter of a large amount of chemical fertilizer from the USSR against Egyptian cotton has been made to Osman Moharram Pasha, acting Prime Minister, according to the Cairo financial weekly "L'Observateur."

The offer, made by "an eminent merchant" whose name the journal does not disclose, is now under consideration by the Ministry of Commerce and Industry. The Russian fertilizers were to be exchanged for cotton bought in the open market at the same price as the last sales to

# geared for progress




From the integrated operations of Pittsburgh Coke & Chemical Company flow a stream of diversified new products—plasticizers for better rubber, paints and plastic products . . . coatings for protection against corrosion . . . chemicals for agricultural and medicinal needs . . . to name a few.

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- Green Bag Cement Division
- Neville Concrete Pipe Company

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says HOPE

**HOPE:**

For years, I've always stuck cotton in my ears whenever the Old Groaner opened his mouth. But now he's got something that sounds good. Really good. Let's hear it, kid.

**CROSBY:**

Thank you, Mr. Hope. You are kind, very kind. Ladies and gentlemen, this isn't a song. It's just a suggestion. This year, let's *all* give U. S. Savings Bonds for Christmas presents. They make wonderful gifts. Tell 'em about those bonds, Chisel Nose.

**HOPE:**

Gladly. It's all very simple—even Crosby understands how they work. In just ten years, they pay $4 for every $3 they cost. And they're appropriate for *everybody* on your Christmas list—young people, middle-aged people, and people as old as Crosby. Am I right, Bing?

**CROSBY:**

For once in his life the old Scene-Stealer *is* right. But seriously, folks, nothing makes a more welcome, more sensible present than U. S. Savings Bonds. And you can buy 'em in any bank or post office. So—

**HOPE:**

So why not give the very finest gift in America—U. S. Savings Bonds!

Give the finest gift of all...

U.S. Savings Bonds

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the United States. The merchant claimed to be aware that the Soviet government had at its disposal large quantities of chemical fertilizers of a high nitrogenous content that had been obtained from German factories.

The fertilizer was said to be available in any quantity for immediate delivery from a minimum of 200,000 tons and was to be sold at a rate of 5% below the current price. Samples were distributed by the Soviet consulate in Cairo, which is authorized to conclude the deal with the minimum of delay before the winter makes transport difficult.

### *Rust Inhibitor Formula*

An oil base soluble in an aqueous medium and adapted for use as a rust inhibitor is described in a recent patent (U. S. 2,516,838). According to this patent, this compound will also act as a metal-working lubricant. Its composition is as follows (amounts are parts by weight):

| | |
|---|---|
| Water | 11.8 |
| Sodium hydroxide | 2.4 |
| Formalin (approx. 40% HCHO) | 2.2 |
| Glycerine | 6.1 |
| Ethylene glycol ethyl ether | 5.8 |
| Hydroxy aliphatic hydrocarbon carboxylic acid of 18 carbon atoms having not more than one double bond | 16.6 |
| Sodium petroleum sulfonate (oil soluble) | 46.1 |
| Extra winter strained lard oil | 9.0 |

The above composition is blended with a liquid petroleum oil base, the oil base comprising from 70 to 90% of the mixture.

### *Special Finishes Booklet*

"Special Finishes for Service, Protection and Appearance" has been brought out in a fourth, and revised, edition in booklet form by the U. S. Testing Company, Inc. The directory gives trade names, their manufacturers and the fibers each finish may be applied to; also information as to properties of the various finishes. Copies are available by writing to Consumer Service Division, U. S. Testing Co., Inc., 1415 Park Ave., Hoboken, N.J.

### *Technical and Coined Names For Insecticide Labels*

The practice of including both the technical chemical name and the coined name in the ingredient statement on labels for insecticides for which coined names have been developed will continue to be required. Officials responsible for enforcing the Federal Insecticide, Fungicide and Rodenticide Act recently checked with the Interdepartmental Committee on Pest Control on the desirability of discontinuing this practice, and after consultation with various groups cooperating in selecting coined names, the Interdepartmental Committee reported that the majority felt it would be unwise to make a change.

• **Anti-corrosion coatings** for metal are described in a new catalog, "3M Adhesives, Sealers and Coatings," just published by Minnesota Mining and Manufacturing Co. This 32-page booklet tabulates the properties of over 100 industrial adhesives, coatings and sealers, cites the availability of over 1,000 formulas, and offers research help.

• **Oakite Products, Inc.,** New York, has published a special service report describing its specialized materials and methods designed to permit faster, easier removal of soils from edible oil processing equipment. Examples of the equipment for which specific material and procedure recommendations are presented.

• **Success with highway ice and dust control** field trials and increased shortages of conventional forms of calcium chloride have prompted The Dow Chemical Co. to step up production of Peladow calcium chloride 94-96% at its Ludington, Mich., plant. Offered in limited amounts for the past two seasons, the pellets are now being priced competitively with the company's established calcium chloride, Dowflake. The high analysis of the pellets means a saving in freight, packing and handling costs, reports Dow.

• **Of interest to manufacturers of silver polish** is "Polish-Ade," a one-piece sponge block which is being produced by Seager & Seager, Glendale, Cal., to assist housewives in cleaning silver. Made of neoprene, the sponge has grooves for forks, a flat section for handles and knife blades, and rounded and indented parts for bowls or spoons. Silver polish is applied to the surface of the block, rubbed on the article, and then washed and dried.

• **A new technical booklet** describing the use of Hercules Powder Co.'s Vinsol resin in the production of Buna N cements and adhesives is now available from the company at Wilmington, Del. The growing use of Vinsol as a resin modifier in the production of adhesives is based on a good combination of properties, including adhesiveness, compatibility with adhesive film-formers, and relatively low cost.

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# NEW TRADEMARKS

*From Official Gazette—Vol. 636, No. 2*

**EIL-BE-KI.** Preparation for killing roaches or water bugs. 580,227. Eil-Be-Ki Chemical Co.

**Eddie's Ever Lasting.** Liquid dyes for shoes, satchels, belts, gloves, straw hats, and the like. 582,471. E-Jay-R-Mfg. Co.

**Mallinckrodt.** For wood's metal used, for example, in mechanisms for fire protection. 568,648. Mallinckrodt Chemical Works.

**Redskin.** For artists' finger paints. 563,485. Milton Bradley Co.

**Cul.** For washing and cleaning compound. 578,137. Culligan Zeolite Co.

*From Official Gazette—Vol. 637, No. 1*

**NORTON.** For abrasive products. 572,112. Norton Co.

**PATROL.** For boot and shoe polishes. 577,450. Patrol Polishes Ltd.

**PLASTICIZE.** For polishes and protective coatings for automobiles, furniture, metal surfaces, tiles, glass, enamels, and such surfaces. 582,840. Plasticize Co.

**SEAL-X.** For liquid rubber cement. 580,572. Chase Industrial Refrigerator Equipment & Engineering Co.

**LAURINE.** For odoriferous material suitable for use in perfumes, flavors, and the like. 570,251. Givaudan-Delawanna, Inc.

**ARTCEX.** For liquid anti-freeze solution. 572,658. V. A. Hall Co.

**DRAPEX.** For organic plasticizer for resins and rubbers. 573,603. Argus Chemical Laboratory, Inc.

**MERTHON 642.** For insecticides and agricultural fungicides. 574,016. Central Chemical Corp.

**PARA-BULLETS.** For insecticide and moth repellent. 575,939. Standard Chlorine Chemical Co.

**ARBONEELD.** For urea-formaldehyde or modified urea-formaldehyde compositions for general use. 578,681. E. I. du Pont de Nemours & Co.

**MICROFILM.** For rust preventative and anti-corrosion compositions. 579,834. Quaker Chemical Products Corp.

**Saf-tex.** For alcohol solvent. 580,958. United Distillers of America, Inc.

**ELASTEX.** For organic esters of alcohols and organic carboxylic acids, and mixtures thereof, suitable for use as plasticizers and as anti-foaming agents. 580,964. Allied Chemical & Dye Corp.

**HGI.** For gamma isomers of benzene hexachloride. 583,476. Hooker Electrochemical Co.

**BIG STINKY.** For insect baits and insecticides. 586,837. William E. Brown.

**M & C MULTI CLEAN.** For floor cleaning compound, rug shampoo, cleaning compound for cleaning walls, floors, and woodwork, and upholstery shampoo. 557,200. Multi-Clean Products, Inc.

**AUDITORIUM BATH.** For soap. 569,045. Armour and Co.

**KNO KLOG.** For drain pipe solvent. 577,292. Universal Refining Products Co., Inc.

**-TOI-KLEEN.** For solvent for cleaning toilet bowls. 582,402. Western Chemical Co.

*From Official Gazette—Vol. 637, No. 2*

(Symbol). For insecticides. 523,369. Central Paint & Varnish Works, Inc.

**Lascorite.** For ready-mixed synthetic paint enamels and lacquers. 501,024. Lasco Co.

**E.N.A.** For thermoplastic enamel for repairing chipped porcelain or enamelware. 523,428. Ark Lab.

**WINDOWLITE.** For preparation for cleaning and polishing glass, nickel, chrome, metal, enamel, and tile surfaces. 564,892. G. E. Palmer Co., Inc.

**STEEL.CO.LITE.** For cleansing powder for cleaning and polishing stainless steel, copper, chrome plated and other metal articles, and porcelain houseware and the like. 569,080. C. C. Manufacturing Co.

**R-M.** For (1) combined polish and cleaner; (2) liquid wax for polishing automobiles and furniture; (3) paste wax for polishing automobiles and furniture; (4) masking compounds for protecting parts against over-spray of lacquer or enamel. 571,164. Rinshed-Mason Co.

**3M COMPANY.** For coated abrasives. 576,120. Minnesota Mining & Manufacturing Co.

**Neutra-Gloss.** For liquid floor wax. 583,865. Du Bois Co.

**R & A.** For adhesive cement. 581,566. Rubber and Asbestos Corp.

**PENACOLITE.** For resin adhesives. 582,792. Koppers Co., Inc.

**NEO-WELD.** For shoe soling cement. 584,335. Lamac Process Co.

**GARDIT.** For gummed tape. 584,765. Gummed Products Co.

**Xcel.** For anti-freeze, rust inhibitor, and combined anti-freeze and rust inhibitor for automotive vehicle cooling systems. 528,374. Pure Oil Co.

**TILE PLAST.** For composition comprising a mixture of fatty acids and pitch, used as an ingredient in tile to render the same pliable. 549,491. Armour and Co.

**Packard.** For anti-freeze soluton for windshield washing compound, radiator cleaning and flushing compounds, anti-freeze solution and similar automotive specialties. 570,116. Packard Motor Car Co.

**CLENESCO.** For bactericides, disinfectants, corrosion inhibitors, inhibited acids used as scale and milk stone remover, and controller. 571,116. Cowles Chemical Co.

**PermaGard.** For wood preservative. 572,535. Thompson-Hayward Chemical Co.

**TOP SKIN.** For hand protective composition. 577,149. Charles J. Sprusil.

**WAXENE.** For liquid preparation for providing a glossy and non-drag surface to natural, synthetic and reclaimed rubber. 583,686. Genseke Brothers.

**DRY-EX.** For alcoholic solvents used to absorb moisture, dissolve gum, prevent freezing in fuel systems, and for other industrial purposes. 585,431. Commercial Solvents Corp.

**GRAPH-O-FIX.** For acid hardening fixing powder. 586,694. Philip A. Hunt Co.

**Gilron.** For rust proofing compositions for temporarily preventing rusting of metal between different steps of processing. 586,852. Gilron Products Co.

**WEEDEX.** For weed killer. 587,796. James Good Co.

**CADALYTE.** For chemical mixture, known as "bright dip," used to produce bright surfaces on cadmium electroplated articles. 588,292. E. I. du Pont de Nemours & Co.

**COROMATE.** For plant fungicide. 588,346. Pittsburgh Plate Glass Co.

**COROTHION.** For insecticide. 588,387. Pittsburgh Plate Glass Co.

**DILAN.** For insecticides. 588,553. Commercial Solvents Corp.

**VYMUL.** For printing ink especially adapted for application to vinyl film. 582,625. Interchemical Corp.

**PRIMELAC.** Paint varnishes. 488,255. Bissell Varnish Co.

**LUXOID.** For enamel paint ready for use. 527,672. Minnesota Paints, Inc.

**ECO SPAR.** For lacquers, pigmented air drying enamels, and varnishes. 537,922. Maas & Waldstein Co.

**CENOLCO.** For paints for exterior use. 540,248. Central Petroleum Co.

**ROOF-LIFE.** For ready mixed colored roof paint. 541,447. Republic Paint & Varnish Co.

**MAN CHESTER.** For paints and related materials. 550,495. Davis Paint Co.

**EPI-TEX.** For resins and resin solutions for use in paints, varnishes and enamels. 550,588. Devoe & Raynolds Co., Inc.

**Mrs. Lane's.** For floor wax. 553,078. Clover Farm Stores Corp.

**Oiltite.** For paint enamel. 554,084. Black Diamond Paint & Varnish Works, Inc.

**EPI-REZ.** For resins and solutions of resin in organic solvents for use in paints, varnishes and enamels. 555,061. Devoe & Raynolds Co., Inc.

**NEGRITE.** For black asphaltum paint. 556,064. Armstrong Paint & Varnish Works.

**Carey.** For asphaltic roof paint, primer, and roof coating in the nature of roof paint; metal paints; paint intended to be used on concrete and other construction surfaces. 556,477. Philip Carey Mfg. Co.

**Wall Charm.** For self sealing flat wall paint. 556,886. Harrison Paint and Varnish Co.

**LUCASPAR.** For varnishes and varnish stains. 560,120. John Lucas & Co., Inc.

**905.** For outside house and other paints and related materials. 568,784. Farrell-Calhoun, Inc.

**STRIPEWITE.** For paints in semi-paste form for application to all types of surfaces for decorative purposes only. 569,448. R. F. Johnston Paint Co.

**COLORTREAD.** For concrete paint. 571,586. Tremco Mfg. Co.

**PHENOCHROME.** For transparent and colored baking enamels. 573,774. Interchemical Corp.

**DRAMEX.** For interior wall and ceiling combination paint and crack filler. 574,111. Reardon Co.

**CAR-NA-VAR.** For floor filler and finish containing both varnish and wax used as a protective and preservative coating. 575,199. Continental Car-Na-Var Corp.

**Stewart's.** For exterior and interior house and other paints and related materials. 575,731. Stewart Paint Mfg. Co.

**FESTINOL.** For paint colors and varnishes. 575,993. Le Ripolin (Societe Anonyme Francaise de Peintures Laquees et d'Enduits Sous-Marins, Procedes Lefranc & Friegler Reunis).

**Quon-Kote.** For ready-mixed paint for exterior surfaces. 576,693. Great Lakes Steel Corp.

**WITCOTE #4 UNDERCOATING.** 576,830. Witco Chemical Co.

**BobbyBrite.** For aluminum paints. 582,821. Claronex Products, Inc.

**AMAZART.** For non-inflammable and permanent paint packed in tubes supplied with ball paint tips for writing, drawing, decorating, and marking. 585,364. Binney & Smith Co.

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## HEXAMETHYLENETETRAMINE

U.S.P. (Methenamine) Granular and Powder—shipped in 100, 50 and 25 lb. fiber drums. Technical Granular and Powder—shipped in 200 lb. barrels, and 100, 50 and 25 lb. fiber drums. Bag packing also available. Whether used as a pharmaceutical or as an intermediate for resins, plastics and chemicals, these Heyden products can be relied upon for highest quality.

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Clear, colorless liquid of highest purity and uniformity, with a minimum assay of 37%. Available in U.S.P. grade and methanol-free grade. Shipped in tank cars, tank trucks, drums, carboys and bottles.

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## *NEW TRADEMARKS——*

**PRACTIcalPAK.** For detergents for washing machines, and for washing hands. 556,096. Lowell L. Haines.

**MEXO.** For powdered soaps for use in soap dispensers for cleansing the hands. 568,216. Rochester Germicide Co.

**TOPAZ.** For soap and liquid synthetic detergent for household and industrial use. 569,043. Armour and Co.

**Stain-X.** For inhibited acid for removing iron and rust stains, and for dissolving lime deposits and scale, both without harm to metal. 569,972. Higley Chemical Co.

**BLENDEA.** For dishwashing compound. 570,253. Scott Detergents.

**first.** For antiseptic liquid detergent for use on floors, walls, rugs, draperies, upholstery, etc. 583,815. Piatt & Smillie Chemicals, Inc.

**SELCODENE.** For synthetic floor wall and woodwork cleaner. 583,954. Selig Co., Inc.

**Suds a-lot.** For chemical cleaning compound adapted for washing and general household uses having incidental bleaching, disinfecting, and deodorizing properties. 528,884. Barton Chemical Co.

**SAFE-T-LINE.** For paints (ready-mixed or paste form) for use on asphalt, macadam, brick, cement, concrete, wood, and metal surfaces. 528,895. W. W. Lawrence & Co.

**Tufseal.** For waterproof paint used for outside application on concrete blocks and other masonry. 528,896. Tufcrete Co.

**"Sta-Soft."** For chemical dough conditioner for bakery products. 528,897. C. J. Patterson Co.

**THE MOST TREASURED NAME IN PERFUME.** For soap. 528,901. Chanel, Inc.

**SHINA DISH.** For soapless detergent for household use. 528,912. Perfex Co.

**LUMBER TOX.** Chemical wood preservatives. 528,914. Wood Treating Chemical Co.

**Evn-Sheen.** For interior paints; enamels; etc. 528,822. F. W. Woolworth Co.

**LOEB STEDASALT.** For salt substitute comprising magnesium citrate, calcium acid phosphate, ammonium chloride, potassium chloride, calcium formate, potassium formate, and starch. 528,923. Loeb Dietetic Food Co., Inc.

**SELECTONE.** For interior decorative paint finishes. 528,924. Old Colony Paint & Chemical Co.

*From Official Gazette—Vol. 637, No. 3*

**BEAM.** For liquid cleaning preparation for cleaning and polishing painted, enameled, and varnished surfaces. 514,268. Beam Chemical Co.

**SUNSHINE AUTO CUTTER.** For detergent preparation for cleaning automobiles and other metallic painted or unpainted surfaces. 513,556. Cobbs' Mfg. Co.

**SHELLMAKER.** For limestone used for chicken feed. 542,511. Calcium Carbonate Co.

**WIND-O-SPARKLE.** For window cleaner and polish. 547,100. Manson Distributors.

**PLAS-TEL.** For combined cleaner and for automobiles, and finished painted, enameled, or lacquered surfaces. 574,377. Plaze, Inc.

**PER-EM.** For polishing wax for floors, furniture, woodwork, linoleum, automobiles, etc. 579,352. Per-Em Wax Co.

**KOPPERS.** For resorcinol-formaldehyde material used as adhesives. 574,583. Koppers Co., Inc.

**Posetape REJUVENATOR.** For liquid adhesive used to restore adhesion to adhesive tapes. 581,762. Posees, Inc.

**ALCOSOL.** For solvents having general use. 533,881. Grain Processing Corp.

**SODYECO.** For dyestuffs and various textile chemicals. 553,534. Southern Dyestuff Corp.

**SODYEFAST.** For various textile chemicals. 553,536. Southern Dyestuff Corp.

**SODYEFIDE.** For various textile chemicals. 553,537. Southern Dyestuff Corp.

**SODYERECT.** For dyestuffs. 553,538. Southern Dyestuff Corp.

**SODYESAN.** For various textile chemicals. 553,539. Southern Dyestuff Corp.

**SODYESUL.** For dyestuffs. 553,540. Southern Dyestuff Corp.

**SODYEVAT.** For dyestuffs. 553,541. Southern Dyestuff Corp.

**CARNAUBIT.** For beeswax, carnauba, candelilla, japan, sugar cane, and petroleum waxes, and various blends of the same. 571,585. Tilbury Refining Corp.

**BLOT.** For floor absorbent and skid proofing compound for absorbing oil and water from floors and protecting. 573,283. Wyandotte Chemicals Corp.

**LAUNDRAZYME.** For enzymatic preparation for removal of starches and proteins from washable fabrics. 573,579. Wallerstein Co., Inc.

**Paispearl.** For chemical preparation to be applied to or incorporated in various materials to impart a pearl-like appearance thereon or therein. 574,109. Paispearl Products, Inc.

**Gold Bond.** For lye. 574,686. Buckeye Soda Co.

**IMINOL-D.** For herbicidal compositions and stabilizers therefor. 575,785. Pittsburgh Coke & Chemical Co.

*(Turn to page 796)*

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# NEW CHEMICAL PRODUCTS

## *GA & F Introduces New Chemicals* (770A)

**Acetylene derivatives and surface-active agents introduced by General Aniline & Film.**

General Aniline & Film Corp. has made available the following chemicals: polyvinyl pyrrolidone, polyvinyl methyl ether, Agent 460-BR, butynediol, Agent 460-AL and Agent 377.

Polyvinyl pyrrolidone is an acetylene derivative which has been used in Europe as a blood plasma substitute. It is being produced in the company's new high-pressure acetylene semi-works at Grasselli, N. J., and is being shipped in lots up to 100 lbs., with lots as small as ½ lb. available for experimental purposes.

Polyvinyl methyl ether, available in carload lots packed in 55-gal. drums, is also a product of high-pressure, high-temperature acetylene reactions and is useful particularly in the synthesis of pharmaceuticals.

Butynediol, an acetylene glycol, available in limited commercial quantities, is an intermediate in the preparation of a wide variety of chemicals.

Agent 460-BR is a surface-active agent which not only has unique properties as a detergent and emulsifying agent, but is also an efficient corrosion inhibitor which protects ferrous metals from attack by mineral acids.

Agent 460-AL has wetting, foaming, emulsifying and detergent properties and is, in addition, being used in cleaning rust and scale from water lines, boiler tubes, heat exchangers and other service equipment.

Agent 377 is one of a series of non-ionic surface-active agents having foaming, wetting and detergent properties of varying strengths making them suitable for a broad range of applications.

## *Vinyl Plasticizer for Food Wraps* (770B)

**Special grade of dioctyl phthalate is suitable for vinyl films used in food packaging.**

Carbide and Carbon Chemicals Division's Flexol plasticizer DOP has been found suitable for use in vinyl plastics which come in contact with many foods. Accordingly, a special grade is now being produced in commercial quantities for use in such applications. The new grade, called Flexol plasticizer DOP-20, is laboratory-checked for absence of taste and odor. It has the same stability and low-temperature properties as regular Flexol DOP.

This development is based on results of two years' toxicity tests and studies of the plasticizer's resistance to extraction from vinyl food-wrap films.

The company recommends its trial in these applications: film wraps for prepackaged lamb and beef, vegetables, cheese, and frozen foods; water and ice bags; intravenous tubing; cap liner stock coatings; coatings for food conveyor belts; and adhesives for food packages.

## *Casting Resin* (770C)

**Dimensionally stable phenolic casting resin permits economical duplication of tools and models.**

Manufacture of a new liquid phenolic casting resin, called "8000" tool plastic, has been undertaken by Durez Plastics & Chemicals, Inc., for Rezolin, Inc.

The new product is said to eliminate the shrinkage encountered in previous materials of this type and permits economical output or duplication of tools and models without requiring elaborate shop equipment or a large number of skilled personnel. Dimensional stability of the cast articles is claimed to be unusually high.

The new plastic, always used with an accelerator paste, is available in two types: the "8000" paste and a quick-set paste. Neither of them requires fillers.

## *PVA Resins* (770D)

**Three new polyvinyl acetate resins will find application in textile and paper fields.**

A high-viscosity polyvinyl acetate emulsion, Polyco 369, is one of three new polyvinyl acetate resins introduced by American Polymer Corp. It is manufactured by controlling polymerization conditions, and not by addition of extraneous thickening agents which lower water resistance.

The second, resin emulsion 1040-14B, is designed for the adhesive industry. It has excellent particle size, fair water resistance, good mechanical stability and dries to a clear film. This resin emulsion is also potentially useful to manufacturers of textile finishes and paper coatings.

Polyco Resin 953-7A, the third new product, was developed for the textile finishing industry. Unmatched for its wash resistant and stiffening properties, this new resin is a versatile tool in compounding textile finishes and paper coatings.

**Do You Want More Information?**

CI has made it easy for you to learn more about any item described in this section. Simply encircle the product's identifying number on the Reader Service postcard inside the back cover.

## *Resin Catalyst* (770E)

**Polymerization catalyst is suitable for both urea and melamine resins.**

Catalyst AC-4, for use in resin baths of both urea and melamine types, is a new development of the textile chemicals department of Monsanto Chemical Co.'s Merrimac Division.

As applied to textiles, Catalyst AC-4 promotes resin polymerization and fixation during curing operations. (Monsanto's catalysts for textiles also include Catalyst AC and AC-2, used in the resin bath to keep it stable.)

## *Phosphors* (770F)

**New series of phosphors for color television available for experimental work.**

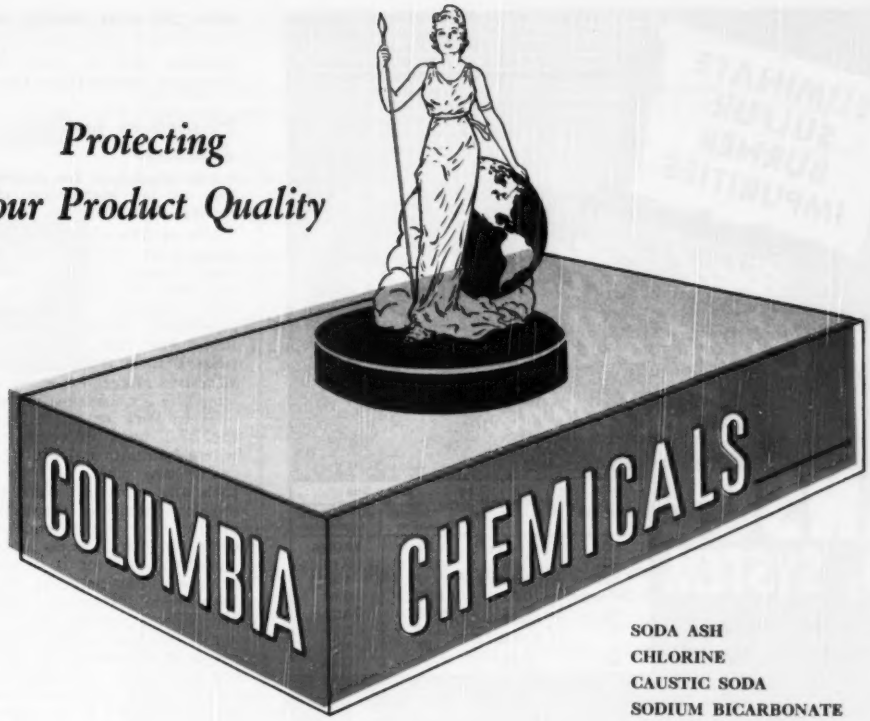
Fluorescent powders for the development of color television picture tubes are suitable to several types of electronic color TV systems now being considered. The new chemicals were developed by the Tungsten and Chemical Division of Sylvania Electric Products, Inc.

The two groups of TV color phosphors, which are now available in engineering sample quantities, include sulphide and oxide types in the three basic TV colors: red, green and blue. The oxide powders are relatively fine texture, while the sulphides are of about the same particle size as those now used in standard black and white picture tubes.

The development of suitable red phosphor material has hitherto presented a problem. Conventional red phosphor mixes have lacked color depth as a result of the relatively low brightness obtained and excessive light output in the green and blue region. The new, improved red phosphor is a manganese-activated zinc phosphate.

The new phosphors are being made available to stimulate exploration of various types of screen material pending standardization of TV color techniques by the radio-television industry. As soon as these industry standards are established, Sylvania plans to have color TV phosphors available in commercial quantities.

## *Protecting Your Product Quality*




When you use Columbia chemicals, you protect the quality of your products. A background of more than fifty years experience enables Columbia production technicians to employ controlled methods and supervision that assure chemicals which meet your most exacting standards.

The same thoughtfulness and care that go into the manufacture of Columbia chemicals also are carried on throughout packaging, shipping and delivery.

Skilled personnel, conveniently located plants, accurate attention to detail, and experienced technical assistance are other advantages favorable to Columbia customers.

Check with Columbia on your next chemical requirements. You'll find it pays in many ways. Pittsburgh Plate Glass Company, Columbia Chemical Division, Fifth at Bellefield, Pittsburgh 13, Pennsylvania.

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**CHLORINE**
**CAUSTIC SODA**
**SODIUM BICARBONATE**
**CALCIUM CHLORIDE**
**CAUSTIC ASH**
**MODIFIED SODAS**
**SODA BRIQUETTES**
(*Iron Desulphurizer*)
**PHOSFLAKE**
(*Bottle Washer*)
**SILENE EF**
(*Hydrated Calcium Silicate*)
**CALCENE T**
(*Precipitated Calcium Carbonate*)
**HI-SIL**
(*Hydrated Silica*)
**PACIFIC CRYSTALS**
(*Sodium Sesquicarbonate*)
**BORAX**
**PARA-DICHLOROBENZENE**
**ORTHO-DICHLOROBENZENE**
**MONO-CHLOROBENZENE**
**BENZENE HEXACHLORIDE**
**PERCHLORETHYLENE**
**MURIATIC ACID**

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ELIMINATE SULFUR BURNER IMPURITIES

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EASY TO INSTALL
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| | | Poor Operation | Very Efficient Operation |
| $SO_2$ | 99.9+% | 4.90% | 19.08% |
| $SO_3$ | 0.00 | 1.95 | 0.10 |
| $H_2O$ | less than 0.01 | 1.47 | 0.40 |
| S (Sublimed) | 0.00 | 0.49 | 0.10 |
| $N_2$ | less than 0.10 (L.P.) | 76.50 | 78.32 |
| $O_2$ | | 13.72 | 1.00 |
| A | | .97 | 1.00 |
| Ash | 0.00 | Trace | Trace |

It's so easy to install this Ansul $SO_2$ System and get these proved advantages:

GREATER SOLUBILITY — As indicated in the table, much more concentrated water solutions of $SO_2$ may be obtained from 99.9+% Ansul Liquid $SO_2$ than from the most efficiently produced burner gas.

HIGHER PURITY — Elimination of impurities inherent in burner gas (Ansul Liquid $SO_2$ is 99.9+% (by weight) PURE).

CONTROL — Easy, positive control providing extreme accuracy for reaction or adjustment of pH.

GREATER ECONOMY — Small investment in equipment, materially reduced operating and maintenance costs, and freeing of valuable floor space.

PHYSICAL PROPERTIES

| | |
|---|---|
| Chemical formula | $SO_2$ |
| Molecular weight | 64.06 |
| Color (gas and liquid) | Colorless |
| Odor | Characteristic, pungent |
| Melting point | −103.9°F. (−75.5°C.) |
| Boiling point | 14.0°F. (−10.0°C.) |
| Density of liquid at 80°F. | (85.03 lbs. per cu. ft.) |
| Specific gravity at 80°F. | 1.363 |
| Density of gas at 0° C. and 760 mm: | 2.9267 grams per liter (0.1827 lb. per cu. ft.) |
| Critical temperature | 314.82°F. (157.12°C.) |
| Critical pressure | 1141.5 lbs. per sq. in. abs. |
| Solubility | Soluble in water |
| Purity | 99.9+% (by wt.) $SO_2$ ($H_2O$ less than 0.01%) |

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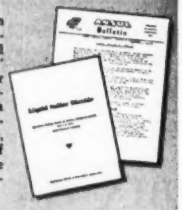
Send for Bulletin C-020.1, "A comparison of Ansul $SO_2$ and Sulfur Burner Gas," and also for your copy of "Liquid Sulfur Dioxide" — a treatise on the properties, characteristics, and industrial uses of Liquid Sulfur Dioxide — written by the Ansul Technical Staff.



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Sylvania plans to have color TV phosphors commercially available.

## *Plasticizers for Adhesives* (772A)

**New plasticizers for dextrine adhesives are less hygroscopic, more economical than glycerine.**

Use of new plasticizing agents is claimed to provide great improvement in sealing quality, non-blocking characteristics, lay-flat features and appearance of envelope seal gum flaps. Paisley Products, Inc., found that the hygroscopic plasticizers formerly used in dextrine adhesives attract excessive moisture from the air, causing stored envelopes to stick or block together at the seal flaps in many localities where humidity is high.

The new plasticizers do not absorb any more moisture than the envelope dextrines themselves, permitting their use on envelopes destined for coastal areas and tropical climates, wherever it is feasible to use plain dextrine gums. Field tests have been extremely satisfactory and full production of the plasticizing agents has begun for the firm's prepared envelope gums and for the use of envelope manufacturers who prepare their own gums from dextrines produced by its parent company, Morningstar, Nicol, Inc.

Each envelope plant requires a plasticizing formula adjusted to suit its equipment and weather conditions. The amount of plasticizer required is approximately the same as formulas based on glycerine plasticizers, with the added advantage of economy due to a lower initial cost. The maker claims economies up to 150% over other plasticizing agents.

## *HCHO in Alcohols* (772B)

**Solutions of formaldehyde in lower alcohols are useful in making alkylated urea-formaldehyde resins.**

Solutions of formaldehyde in various types of alcohols are being made available by the chemical division of Celanese Corp. of America. Known as Formcel, the new product is now being produced on a pilot-plant scale at Celanese's Bishop, Texas, plant. It is currently being sold in semi-works quantities as 55% solutions of HCHO in methanol and 40% solutions in butanol, propanol, and methanol. The formaldehyde is believed to be present as a hemi-acetal.

Tests have proved the practicability of handling a relatively water-free alcohol solution of formaldehyde at regular temperatures in standard equipment.

Cost savings and convenience of handling by regular methods make Formcel attractive to consumers whose processes are based on a formaldehyde-alcohol end product.

This lead pipe was exposed to Dilute $HNO_3$ for 2 weeks.

Pipe corroded half-way through, unsuitable for further service.

This glass-lined steel elbow was exposed to 10% HF for 1 day.

Glass lining completely removed from fitting.

This porcelain elbow was dropped 6 feet onto concrete.

Damage complete.

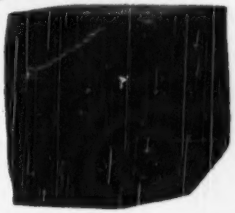
This plastic-lined steel elbow was heated at 250°F. for 1 day.

Short exposure to heat produced breakdown of the lining.

This high-silicon iron elbow was subjected to thermal shock.

This plastic elbow discolored ethyl acetate.

## This "KARBATE" impervious graphite elbow was:



1. Exposed to 30% $HNO_3$ for 2 weeks
2. Dropped 6 feet onto concrete
3. Subjected to thermal shock
4. Exposed to 10% HF for 1 day
5. Heated at 250°F. for 1 day . . . and
6. Did not discolor ethyl acetate

**"KARBATE" IMPERVIOUS GRAPHITE WITHSTANDS SEVERE OPERATING CONDITIONS, NOT FOR DAYS OR WEEKS, BUT FOR YEARS.**

# LET THE RECORD SPEAK!

MANY corrosion-resistant materials are suitable for specific operations, BUT can they handle UNFORESEEN changes in operating conditions? The six materials shown above were subjected to conditions outside their range of application. They failed. But "Karbate" impervious graphite took all these conditions, and will continue to take them, not for days or weeks, but for years.

Your best bet to avoid scrapping equipment due to a process change is to specify "Karbate" impervious graphite.

---

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**MORE THAN DOUBLE THE USABLE LIGHT!**

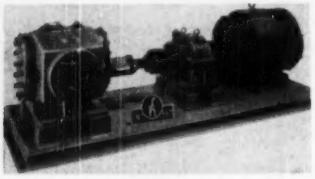
The biggest news since the invention of flashlights—the brand new, leak-proof "Eveready" No. 1050 flashlight battery—gives you more than double the usable brilliant white light for critical uses than any other flashlight battery we have ever made. NO METAL CAN TO LEAK OR CORRODE.

# NEW EQUIPMENT

## *Steam-Jacketed Pump* (774A)

**New steam-jacketed herringbone gear pump handles viscous liquids.**

To insure even thermal distribution, the steam jacket on the new pump being offered by Schutte and Koerting Co., completely covers the internal parts. The inlet, outlet and cover flanges are cast integral with the pump base, and rigid housing



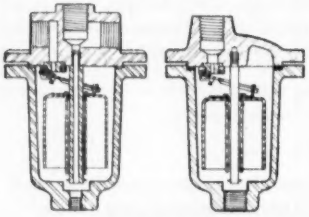
eliminates possibility of distortion due to pipe line strain or misalignment. Straight bore housing also prevents shaft deflection and bearing overhang. Shafts are of heavy duty alloy steel, finish ground.

Pressure on the stuffing box is dissipated through a channel in the cover plates. Steam connections on the pump jackets are readily accessible and are designed to permit a variety of piping arrangements. The complete rotor and bearing assembly can be removed as a unit simply by releasing the coupling and removing the rear cover. To prevent slippage, the gear teeth have a specially designed high pressure angle tooth. The pump is available in Meehanite B, cast steel, bronze or special alloy case.

## *Steam Trap* (774B)

**New inexpensive small forged steel steam traps are available for high pressure, super-heated steam service.**

The new steam traps, developed by the V. D. Anderson Co., are suitable for steam at 500 psi and 800° F. with ½″ or ¾″ pipe con-



Sectional view of #340 Sectional view of #60

nections. These units are of forged steel to withstand shock and explosions. The internal parts are of stainless steel with valve and seat made of Anderloy, a special alloy developed by the V. D. Anderson Company for steam service. These small traps have a recessed gasket to prevent blowing out.

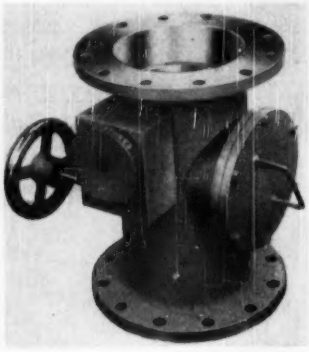
These forged steel traps are made in two principal types. No. 340 is installed straight-in-line or as an elbow, No. 60 is designed with the inlet in the bottom and the outlet connection in the top for a vertical installation.

## *High Vacuum Disc Valve* (774C)

**A new series of high vacuum disc valves produced by the F. J. Stokes Machine Co., is available for all high vacuum applications.**

The new valves are of the butterfly disc type. Standard sizes are 6″, 8″, 10″, and 12″.

The butterfly design requires only a fraction of the space needed for



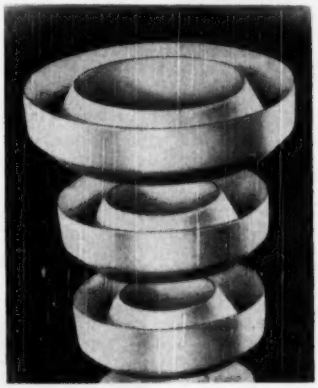
other types. Opening and closing are effected through a worm gear and the operator is assured of complete safety through automatic locking of the valve in any position. There are no levers to snap back.

The valve is designed for pressure differential in both directions. If it is used in connection with a vacuum pump hooked up to a chamber, it is not only possible to exhaust the chamber through the valve, but also by closing the valve, vacuum can be released to the pump and still held in the chamber. A tight seal is further assured when in closed position by a stainless steel valve seat that cannot rust. No lubrication of internal parts is required.

### Do You Want More Information?

CI has made it easy for you to learn more about any item described in this section. Simply encircle the product's identifying number on the Reader Service postcard inside the back cover.

## *V-Ring Packing* (774D)

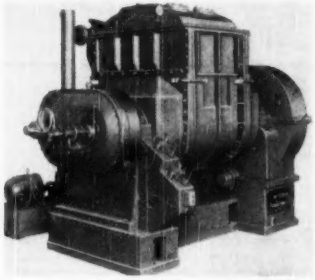


***Crane Packing Co.'s "Chemlon V-Rings" molded from pure Teflon are frictionless, cause no wear on hydraulic valves, are chemically inert, and are not affected by corrosive solutions. They stand temperatures up to 450°F. Even at varying pressures a perfect seal is assured.***

## *Kneader* (774E)

**A new dispersion blade unit (pat. pend.) has been developed for color flushing.**

The new unit, produced by Patterson Foundry & Machine Co., is equipped with mixing blades that flush to a higher pigment concen-

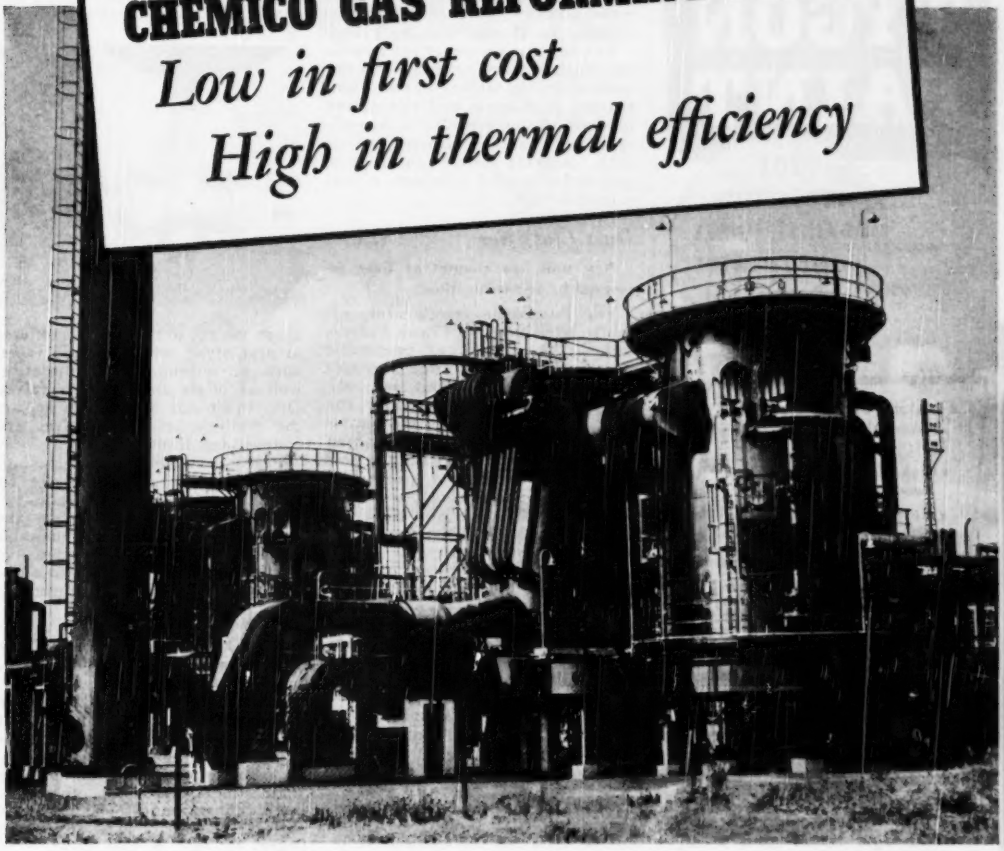


tration, leaving less moisture to be removed under vacuum. Furthermore, it is stated, they add as much as 40% to the heat transfer area available.

Batches of filter press cakes, after being mixed and having initial water

# CHEMICO GAS REFORMING PLANT

## *Low in first cost*
## *High in thermal efficiency*



Among the many types of heavy chemical plants Chemico designs and constructs are those for the production of synthesis gas, principally hydrogen. The gas reforming plant, shown above, is located in the synthetic ammonia works of the Office National Industriel de l'Azote at Toulouse, France. It has been operating successfully for a year and a half.

Other Chemico installations for the catalytic reforming of natural gas have been producing for as long as eight years. The total output of all these plants is more than 180,000,000 cu. ft. of reformed gas per day. Four more plants are now under construction in the United States and foreign countries.

Chemico's design provides important advantages. These plants are low in first cost, high in thermal efficiency. Construction is simple. The plant is foolproof . . . requires a minimum of operating and maintenance attention.

**CHEMICO**
**GAS REFORMING PLANTS**
***are used for making:***

- **Hydrogen-nitrogen mixtures for ammonia synthesis.**
- **Hydrogen and carbon monoxide mixtures for methanol synthesis.**
- **Carrier gas for blending with natural gas for distribution by Public Utilities.**
- **Hydrogen for industrial uses.**

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decanted, are finish dried under vacuum and increased temperatures. The ability to heat batches during this second portion of the process more quickly and evenly has contributed to shorter flushing cycles.

Further arrangements for trouble free flushing have been made in the form of special stuffing boxes. Maintenance of vacuum and elimination of shaft erosion are effected by multiple ring packing, lantern glands with constant forced lubrication, and spring loaded followers of improved design.

### *Dust Classifier* (*776A*)

**New unit ups amount of fines recovered by reclassification.**

The dual cone fractionator, recently introduced by Prater Pulverizer Co., is actually two pneumatic classifiers built into one compact unit. The material is first separated into two fractions—one, fine; the other coarse. Normally the coarse fraction is immediately discharged from the system; but with the new fractionator the coarse material is reclassified before being discharged, which is said to reclaim an additional 10 to 15% of the fines originally in the raw material.

The original separation can be made at any predetermined particle size by opening a secondary air valve until the desired product is obtained. Two control valves govern the classifying action inside the fractionator by admitting secondary air at strategic points.

The fractionator is built in 21 sizes from 500 lb/hr. pilot plant to 20,000 lb/hr., fabricated of steel, galvanized, stainless, nickel, or Monel.

• *(776B)* Bristol Co. has developed a new line of **strip-chart electronic instruments**, the Series 500 Strip-

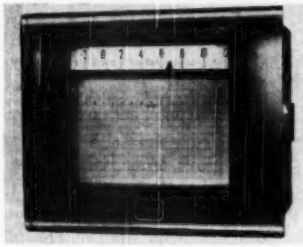
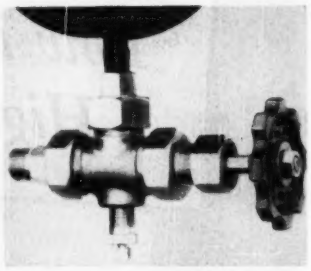


Chart Dynamaster. The Dynamaster is a high-speed, self-balancing AC bridge for measurement of temperature, resistance, conductivity, strain, position, inductance, pressure, force, or any other variable which can be measured in terms of impedance.

• *(776C)* **Valves** for instrument piping and general use which reduce threaded connections from ten to three are available in a complete new line being made by Jerguson Gage & Valve Co. Unions, nipples, reducers, elbows, tees, valves, and drain valves are combined in one



space saving unit, which is offered in nine styles which include valves with or without union outlet as well as offset and jacketed valves. One valve can be used to replace the multiple set-up of valves and connections formerly used.

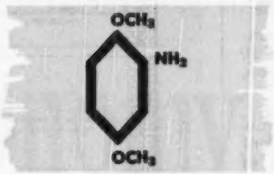
Features include: A safety shut-off; a double-seating stem for repacking under pressure; choice of regular or quick-closing stem and lever; regrindable and renewable seats; pressure bleeder valve and test gage connection; outside screw and yoke when desired; throttling stem when desired.

• *(776D)* The Frederick S. Bacon Laboratories are now manufacturing precision **O-Rings** that provide hydraulic seals resistant to petroleum oils and most hydrocarbons. The O-Rings are molded from a mixture of Silicone rubbers more resistant to deformation under compression than either natural or other synthetic rubbers, and which are claimed to retain flexibility even at temperatures of —65° F. and lower.

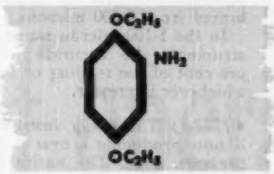
• *(776E)* The Stephens-Adamson natural frequency **conveyor** (balanced type) is for use where vibration from vibrating conveyors transmitted to supporting structures is a problem. A balance frame, moving in a direction opposite that of the conveyor trough, cancels the thrust due to the inertia of the moving trough, and prevents vibration from reaching the mounting frame. Since the conveyor will not "creep," no heavy anchor bolts are required and it can be easily mounted, or suspended.

• *(776F)* A redesigned line of **thermocouple vacuum gages** for industrial, lab. and other applications where vacuum must be accurately measured has been announced and is being produced by General Electric Co. Included in the line are a 115-volt, AC, portable thermocouple vacuum.

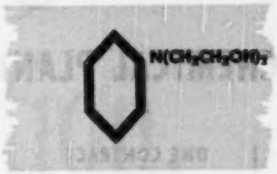
# EASTMAN aromatic amines




DIMETHOXY ANILINE

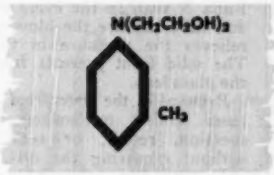



DIETHOXY ANILINE

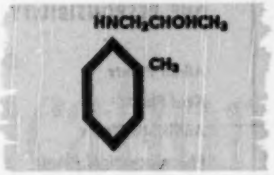



PHENYL DIETHANOLAMINE

PHENYL ETHYL ETHANOLAMINE




M-TOLYL DIETHANOLAMINE




O-TOLYL PROPANOLAMINE

The six Eastman aromatic amines provide a source of an unusual range of couplers and intermediates. Primarily employed in the manufacture of dyes and pharmaceutical chemicals, these compounds are also receiving active consideration as intermediates in the preparation of new insecticides and fungicides.

The two primary amines, dimethoxy and diethoxy aniline, readily form diazonium salts. By virtue of their alkoxy groups these amines are easily coupled to such salts and the resulting compound can again be diazotized.

Under proper conditions phenyl diethanolamine and phenyl ethyl ethanolamine react with the carboxylic oxygen of benzaldehyde or substituted benzaldehyde to produce various triphenyl methane compounds.

Both the phenyl and the tolyl amines are excellent coupling agents and as such find wide usage in the dyestuff industry.

We will be pleased to send you additional information and sample quantities of the Eastman aromatic amines. Write to TENNESSEE EASTMAN CORPORATION (Subsidiary of Eastman Kodak Company), KINGSPORT, TENNESSEE.

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**TENNESSEE EASTMAN CORPORATION (Subsidiary of Eastman Kodak Co.), KINGSPORT, TENNESSEE**

gage, and types for both rack and panel mounting.

Usable on either glass or metal vacuum systems, the gages give a continuous indication of pressure and respond almost instantly to pressure changes on a scale calibrated from 0-200 microns.

In the 1-100 micron range, the instruments are accurate within 10 per cent of the reading or 1 micron, whichever is greater.

• *(778A)* The Clapp Instrument Co. is now producing a new solid front **pressure gage.** The entire back of the gage case covered by a waterproof blow-out disc with bonded Buna N seal. In the event of bourdon tube rupture the blow-out disc relieves the pressure in the case. The solid front prevents fracture of the glass lens.

Removal of the waterproof disc exposes entire mechanism for inspection, repair, or recalibration without removing the dial.

The new gage is available in sizes from 4½" through 10" in both surface mounting and flush mounting designs. It is available with all types of bourdon tubes, for ranges from 30" vacuum to 80,000 psi. Standard movements are either of stainless steel, or nylon and stainless steel, the latter being particularly desirable for high frequency pulsation service.

• *(778B)* A new **control system** just announced by Leeds & Northrup Co.—P. A. T. '50—for the first time introduces rate action into an electrically-actuated control. Rate action responds according to the speed with which the controlled variable changes. If furnace temperature, for example, begins to fall, rate action immediately opens the fuel valve. The faster the drop in temperature, the wider the valve is opened. And as the rate of temperature departure decreases, rate action's effect also decreases.

P. A. T. '50 has proportional and reset control actions, and is applicable to the regulation of temperature, pH, chemical concentration and gas analysis.

• *(778C)* Railway and Industrial Engineering Co. is producing the new TTC **short circuiting switch,** a switch for use in electrolytic processes. The TTC switch is designed to be mounted in conjunction with an individual electrolytic cell in a processing series, and remains open when the cell is in operation. When closed, the TTC Switch shunts out the cell.

The new switch is rated in single units at 2500 amperes, but multiple units can be arranged for increased ampere requirements. All contact surfaces are silver-faced; high carbon back-up springs assure positive contact; switch base is insulated with Masonite.


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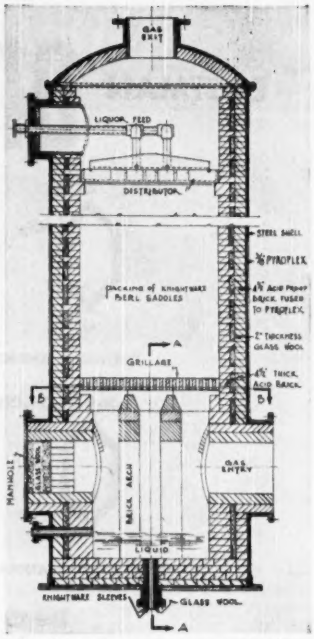


*Pyroflex-constructed tower for cooling HCl furnace gas.*


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**CORROSION PROBLEMS**

***Is Our Business***

In the past 45 years Maurice A. Knight has developed many improved types of corrosion proof processing equipment to meet the needs of customers. These include Knight-Ware Chemical Stoneware, Permanite Resins and Pyroflex Constructions. The latter include tanks, towers, absorbers, fume washers, reactors, etc., and can be designed by our engineers to withstand almost any type of corrosive service.

In addition, we supply our customers with protective paints for wood, concrete and steel surfaces, as well as acid proof cements for floors, tanks, and tower linings in corrosive service.

Whatever your needs, whether complete functional units, vessel linings, pipe and fittings, chemical stoneware, impervious paints or cements, our engineering department will be glad to make recommendations.

***Literature will be sent on request.***

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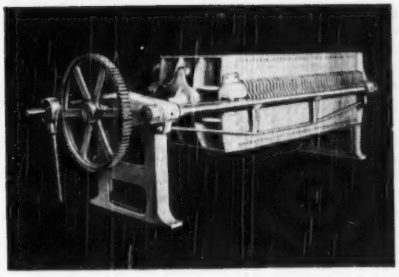
# Simplicity of design, economy of operation, flexibility of application

## SPERRY FILTER PRESSES

These three advantages...simplicity, economy, flexibility...are the reasons for the virtually universal acceptance of the plate filter press as engineered for your process operation by Sperry. Here is what these advantages mean.



Simplicity of design results in a minimum investment in processing equipment and a minimum cost for installation. And, once installed, operation is trouble-free.

Simplicity of design results, too, in economy of operation with no skilled or technical personnel required to obtain first quality results. The simplest types of filter cloth and paper may be used just as they are cut from the roll. The filtrate is of maximum clarity, the cake is delivered thoroughly washed and in slab form ready for the drier trays.

Regardless of filter mixture, Sperry presses have the flexibility required to handle it successfully. Pressures and temperatures pose no problem; nor does resistance to acids or alkalies. The liquid need not be exposed to the atmosphere and the filtrate may be delivered to a point higher than the filter. All types of filter bases may be used and varied at minimum cost should your processing plans be revised.

Whatever your filtration problem, you will find the answer in simplicity, economy and flexibility . . . the advantages offered by the Sperry plate filter press. Why not put Sperry's fifty years experience to work on this problem now? There is no obligation.

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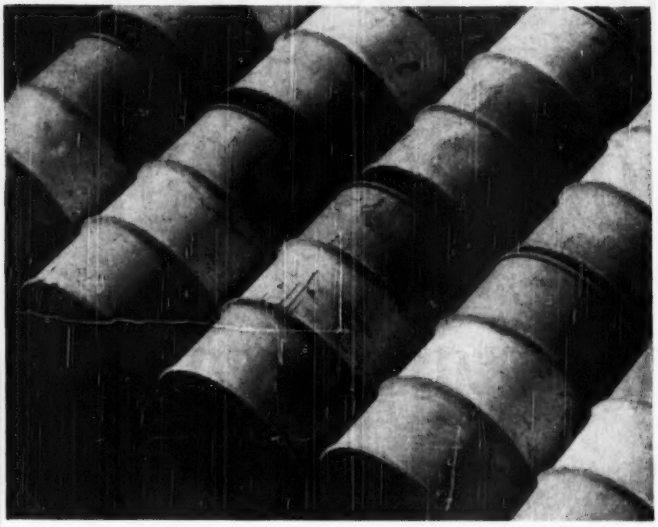
# PACKAGING & SHIPPING

by T. PAT CALLAHAN



## *Containers May Have to be Reused if World Situation Stays Critical*

The serious situation concerning the procurement of containers, similar to that encountered during the last war, has returned again. The chemical industry is once more faced with the job of developing ways and means of insuring sufficient containers for the packaging of their products. During the past five years considerable progress has been made by the industry in establishing safe, economical packages of good appearance for the shipment of their products. But it appears that reuse of certain types of containers and substitution for other types of containers will become a necessity if the critical world situation continues.

Steel, paper, and glass are the three basic materials which enter into the construction of containers for the shipment of the bulk of chemicals produced. And whenever the supply of these basic products is threatened, a shortage in containers follows. Based on experience gained through the last war, the chemical industry is certain to effect a satisfactory program to cope with any situation that may develop. However, some thought should be given to the adoption of a program which will guarantee a container to package every pound of chemicals produced during the coming difficult times.

### *Steel Drums for Reuse*

Various types of steel drums are used by the chemical industry including carbon steel, stainless steel, aluminum, nickel, monel, and other materials in lesser quantity. The drum most commonly used is the 55-gallon, 18-gauge black iron drum, commonly referred to as ICC 17E or Rule 40 drum. It is generally referred to as a single-trip container and is sold to the customer on a drum inclusive basis. For materials which are regulated as hazardous by the Interstate Commerce Commission, the ICC 17E drum must be used and can only be used as a single-trip container. However, during the last war and up until now, under Section 28 (h), this type of drum may be reused if application is made to the Bureau of Explosives and permission obtained from them. This permission requires that the drum be retested to 7 p.s.i. and be stencilled "Authorized for Reuse by the Bureau of Explosives."

Most of the large chemical manufacturers who were forced to reuse this type of container during the last war and for a period after it, returned to the single-trip basis. With the current situation becoming more critical, several of the large companies have again instituted a reuse program and a situation exists similar to that encountered during the last war. In fact drums of this type including ICC 17E and Rule 40, have been placed on a returnable basis with a deposit charge established to insure the return of these drums for reuse. Marked progress by secondhand drum dealers and reconditioners will insure a satisfactory reconditioning job for these drums. Upon their return from a customer they can be satisfactorily reconditioned and again reused for the shipment of chemicals.

During the past few years considerable progress has been made in synthetic lining of steel drums of these types and one of the problems which confronts the industry is to determine how satisfactorily a lined drum can be reused. However, improvements in the reconditioning of steel drums chiefly by the installation of sandblasting equipment by several large used drum dealers will allow these drums to be cleaned thoroughly and relined if necessary. One of the most important factors in the reuse of such single-trip drums is the retesting at 7 p.s.i. to insure freedom from leakage.

Other types of drums except for the light gauge steel drums used for powders and solids are included in the present returnable type of drum. This includes drums of the 5A or acid drum, ICC 5, 14 and 16 gauge returnable drum, and the various alloy drums which have always been shipped on a returnable basis. Close attention to the return of this type of drum is essential and satisfactory records kept so that they will be returned to the producer as soon as they are empty. If again, the situation continues to become critical, the reuse of the present single-trip, 18-gauge, 55-gallon black iron drum will be the answer to a continuing supply of steel drums for the shipment of liquid chemicals.

### *Multiwall Bags Will Help*

The increased use of the multiwall paper bag in the chemical industry during the past years has shown it to be a satisfactory container for a large portion of the dry and powdered materials shipped by the chemical industry. This container being light in weight does not consume as much critical material for a given amount of packaged product as rigid containers; consequently, with any critical shortage the multiwall paper bag will play a very important part. Many of the large suppliers of this type of container have expanded their production and with the large volume of dry and powdered chemicals now moving in this type of container, the chemical industry should be in a very satisfactory condition to continue to ship these types of chemicals if other types of packages become unobtainable.

### *Fibre Drums for Double Duty*

Fibre drums are used extensively within the chemical industry and the plastics industry for the shipment of a great many products. This container being of rigid construction and being capable of withstanding vigorous hazards in transportation is a very necessary container to the industry. Its variations in construction and linings make it an essential package for the

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Finely powdered products will not sift through a Fulton W.P.P.L. Bag. Even moisture or outside vapors from gaseous materials will not penetrate the tough lining of paper or plastic that is laminated with adhesive to the inside of this sturdy bag.

Made of either cotton or burlap, Fulton W.P.P.L. (Waterproof Paper Lined) Bags are ideal containers for export or domestic shipments of hygroscopic materials, and products to be protected from outside influences. Many manufacturers who formerly used rigid containers are finding this tough, flexible, easier-to-handle textile bag a more advantageous and economical package for their products.

Investigation might prove it's the best container for your product. Just drop a line to the Fulton branch nearest you for full information.

*Growing constantly in popularity with industry's largest users of paper bags—Fulton's famous Multiwalls. All types—pasted or sewn bottom, open mouth or valve. Fulton makes the Multiwall to fit your product!*

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Aromatic Chemicals play an increasingly important role, not only in the field of chemistry and industry but practically in all facets of everyday living. Chemicals impart aesthetic importance and sales appeal. They have become an important adjunct of advertising, promotion and merchandising. Chemicals are utilized to make products look good, smell good, taste good and, quite often, feel good to the touch. Chemicals too, express and reflect the tempo and reality of the day like our literature or our movies or television.

For more than 150 years, Dodge & Olcott has devoted its research laboratories and its talents in the development of chemicals to improve American products and to give them greater appeal.

D.O

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ESSENTIAL OILS • AROMATIC CHEMICALS
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shipment of many products. If the demand exceeds the supply, these rigid fibre drums can be adapted to reuse, particularly by a company receiving raw material in the drum and then using it to make shipment of the company's own product.

### *Fibreboard in Short Supply*

All forms of fibreboard are presently in very short supply and extended deliveries of this type of material are being made by most of the large producers. This board in the chemical industry is used in many places, particularly by the repackagers or manufacturers of drugs and chemicals packaged in smaller inside containers. During the last war considerable emphasis was placed on the salvaging and reuse of fibreboard as the armed forces demanded very sizable quantities of this type of packaging. If the situation continues, it can reasonably be expected that a reuse program for fibreboard boxes would be established. However, that is dependent upon an increase in military demands which will be accentuated as the defense program progresses.

### *Glass Hurt by Strike*

Glass containers within the chemical industry are a very important factor in the movement of many chemicals. The tremendous strides made by the manufacturers of glass containers would indicate that for the present at least such containers should be obtainable. But the severe curtailment of soda ash supplies due to the strike bound plants in the chemical industry precipitated a cutback in glass production which might be felt as extended demands for glass containers is encountered.

The quarterly industry report on Containers and Packaging by the United States Department of Commerce indicates that unless the production lost by this strike can be made up during the balance of this year the originally estimated output of the glass industry will have to be revised downward. Users of large volumes of glass containers therefore, will have to pay particular attention to glass container production and be governed accordingly in their needs.

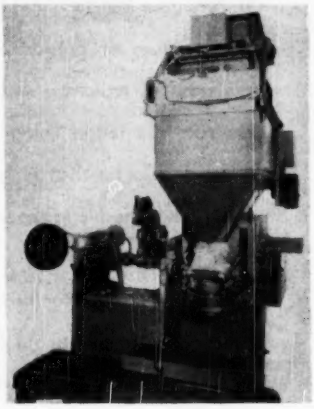
These and other estimates regarding the immediate future of packaging are predicated upon a continuance of the troubled conditions that now exist due to the immense needs of defense and industry. It is a situation that upset the satisfactory container situation that had developed since the close of the war during which a much needed standardization of packages has taken place.

Surely no one wants to return to the difficulties involved in the reuse or substitution of packages. But it would be very foolish to overlook the lessons learned during the last war by failing to take adequate precautions to inaugurate the reuse and substitution of containers wherever necessary. It may be the only way to make certain that packages will be available for the shipment of chemicals.

### *New Gravity Packer* (782A)

A new gravity packer for packing free flowing commodities in either cotton or paper bags was recently announced by the Bemis Bro. Bag Co. The new device is a combined filling, weighing and bag closing unit, so designed that it may be operated by either a one or two man crew.

The Bemis Gravity Packer will accurately pre-weigh and pack such



items as sugar, salt, fertilizer and other similar free flowing products, with a weight range of 50 to 140 pounds. The unit consists essentially of a net weighing scale, a pneumatically operating oscillating mechanism which settles the contents of the bag, a dual bag closing unit which will sew either multiwall open mouth paper or textile bags, and a conveyor. This conveyor is composed of four "V" belts concavely arranged so that the filled bags will stand up unassisted as they pass from the packing spout to the sewing head for closing.

The new packer is the companion machine to the Bemis Packer Aid which is used widely for the packing of non-free flowing products such as flour.

### *Color a Major Factor in Package Purchase Appeal*

The color of the package is often the deciding factor in retail buying habits, according to a well known color consultant. In an article in the Oval, a Canadian publication, Faber Birren of New York revealed that a survey by a major soap manufacturer showed that no design preference was evident among con-

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This new price list also gives description and characteristics of *Neville* quality products, designed to serve various industrial needs.

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FOR TOUGH FILTERING

*Use*

NEWARK STAINLESS STEEL FILTER CLOTH

- CORROSION RESISTANT
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Check these *operating* advantages found in Newark Stainless Steel Filter Cloth. They may suggest the solution to one of your special filtering problems or they may be the answer to your need for a backing cloth that will really stand up through tough, corrosive filtering cycles.

Newark Stainless Steel Filter Cloth is easily adapted to practically all types of filters and is available in a wide variety of weaves. When writing please give us details on your process.

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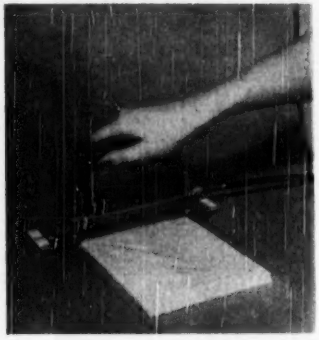
sumers "as long as the basic color of the soap wrapper remained green." Food products offer special color problems of their own. Some manufacturers keep records to measure sales brought about by new designs and color combinations. And they find that there are both appetizing and unappetizing colors. Red yellow and blue are the colors most employed.

On labels where only one color is used, blue ranks highest, brown next. Red and blue are most popular in two-color labels, red and black second, red and green third and yellow and blue fourth. The leading combinations in three color labels are red, yellow and blue, followed by red-blue-gold, red-green-gold and red-yellow-black.

### *Stick-Proof Hand Sealer*

*(784A)*

A new hand sealer for polyethylene was recently announced by Amsco Packaging Machinery Inc. of New York. The unit employs a new principle of sealing which eliminates



the troublesome problem of polyethylene sticking to the sealing iron. It is light in weight and permits extended use with practically no fatigue. The company claims the seals it produces are neat and secure and do not require exacting pressure application or heat dwell time. It is recommended for all homogeneous films which seal by weld.

### *Coating Facilities Increased*

Facilities for coating kraft paper have been tripled by the St. Regis Paper Company to meet the demand for specialty papers and multiwall paper shipping sacks containing this thermoplastic protective barrier ply.

The demand for plastic coated papers has caused the company to place a second and larger polyethylene coating machine in commercial production at the Carthage, New York, paper mill. The first coater to be built by any multiwall

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Fill your requirements by contacting the nearest sales office listed below.

**COAL CHEMICAL SALES DIVISION**
**UNITED STATES STEEL CORPORATION SUBSIDIARIES**
**71 Broadway, New York 6, N. Y.**
208 South La Salle St., Chicago 90, Ill. 1509 Terminal Tower, Cleveland 13, Ohio
Brown-Marx Building, Birmingham 2, Ala. 25 Beale St., San Francisco 5, Calif.

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**UNITED STATES STEEL**

bag manufacturer went into operation more than a year ago at the St. Regis bag plant at Oswego, N. Y.

The Carthage coater offers a wide variety of commercial coating thicknesses, ranging from one half to seven mils. Most commercial coatings to date have been 1½ mils, which is approximately equal to 20 pounds of polyethylene per ream of 24 by 36 inch paper.

Extensive tests were run by the company on the packaging materials made available by the new process. Of particular interest were the findings in connection with the packaging shipping and storage of such products as fertilizers, synthetic resins, ammonium nitrate, calcium chloride and borax in the chemical field. In the food field successful test results were obtained in the packaging of meat trimmings, dried milk and milk by-products, powdered eggs and frozen food packaging.

### *Paper Covers for Drums* *(786A)*

A line of barrel and drum covers made from tough neoprene-impregnated paper have been introduced by the Chase Bag Company. The use of these covers, where barrels and drums are used to handle material in process has proved to be an efficient and economical means of guarding the contents against rain or foreign particles.

The covers are made of a special heavy, creped kraft paper containing a small percentage of neoprene synthetic rubber which is formed at the paper mill by combining neoprene latex with paper pulp. The neoprene adds greatly to the finished paper's wet strength and imparts resistance to sunlight, oil and chemicals.

### *New Packaging Information*

This month saw the release of several interesting books and pamphlets on the subject of packaging. Among these was a 12 page booklet of the Glidden Company of Cleveland entitled "The Inside Story of Protective Linings for Steel Containers." Free copies can be obtained by writing to the company at 11001 Madison Avenue, Cleveland 2, Ohio.

Polymer Industries Inc. of Brooklyn, N. Y. also announced it had copies of its new booklet on labeling available for distribution. Copies may be obtained by writing either the company's plant at 284 Sheffield Ave. Brooklyn 7, N. Y. or the plant at 11-08 30th. Ave., Astoria, N. Y.

# We're putting a lot into Plastics!

The plastics industry may well pride itself upon the tireless research, creative imagination and aggressive promotion which have boosted plastics production 600 per cent in the last 10 years.

We at Barrett, too, take pride in our own contributions to this colorful new world of plastics. Over the years we have kept the industry supplied with a vast and growing stream of basic chemicals and plasticizers. For some of these, we are the world's principal supplier.

Helping businesses like the plastics industry to prosper has made Barrett "one of America's great basic businesses."

If you have any problems involving the use of Barrett* chemicals why not discuss them with the Barrett field representative. We will gladly send you booklets describing Barrett chemicals and their applications.

**BARRETT* CHEMICALS AVAILABLE TO THE PLASTICS INDUSTRY**

"ELASTEX" 10-P Plasticizer • "ELASTEX" 28-P Plasticizer • "ELASTEX" 50-B* Plasticizer
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*its precision bore tubing insures*

**absolute accuracy at every graduation**

- **Fused-in engraved graduations assure permanent markings.**
- **Valve assembly provides positive pressure seal eliminating leakage and freezing of plug.**
- **Manufactured of Fischer & Porter precision bore Pyrex brand tubing.**

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*self-lubricating* **teflon plug** *eliminates contaminating grease*

**For Complete Information Write for Brochure C.**

***The EMIL GREINER Co.***

**20-26 N. Moore St. New York 13, N. Y.**

# LABORATORY EQUIPMENT

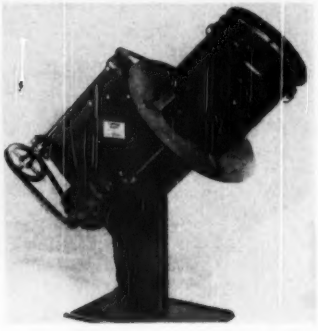
## *Electron Microscope* *(788A)*

**Relatively thick specimens can be examined with new instrument.**

Study of structural details of relatively thick specimens of biological and plant tissues will be made possible by a new high-resolution electron microscope, designed for operation at 50 to 100 kilovolts.

Availability of the higher accelerating voltages will greatly extend the usefulness of electron microscopy in medical and related research fields concerned with tissue specimens too thick for satisfactory examination with conventional electron microscopes of the past. The new instrument makes possible useful direct magnifications of 1000 to 20,000 diameters and is greatly simplified for easier operation and maintenance, according to RCA's Scientific Instruments Engineering Group in Camden, N. J.

## *Tumbler-Mixer* *(788B)*



***Available from Arthur S. La Pine and Co., Chicago, Ill., the Lanco tumbler-mixer will hold any size container from 5 gallon cans to 1 ounce bottles.***

• *(788C)* **Moisture tester** of the Burrows Equipment Co., 1316-CI Sherman Ave., Evanston, Ill., is designed to test the moisture content of many different materials. It gives an accurate direct moisture percentage reading instantly on a dial from 8½ to 40%. With use of charts the instrument can be utilized for testing higher or lower ranges. Although electrically operated it requires no electrical outlets or batteries and is fully portable. A built-in thermometer automatically indicates temperature of sample.

## *Automatic Burner* *(788D)*

***Manufactured by the Hanau Engineering Co., Inc., Buffalo 9, N. Y., an automatic Bunsen burner that flames only when needed, produces a full, regulated flame as hand or finger touches the on-off platform.***

• *(788E)* Available to the petroleum industry is the **Air Well Bath,** product of the Precision Scientific Co., 3737 W. Cortland, Chicago 47, Ill., used to test for elemental or corrosive sulfur compounds in petroleum products. Developed for rapid, convenient, large volume testing of petroleum products, its design meets rigid technical specifications. To facilitate large volume testing, eight brass air wells have been press fitted to the cover of the stainless steel bath. The bath, completely insulated, is equipped with a sensitive hydraulic thermostat that gives automatic temperature control to within ½° C., over a range from room temperature to 100° C. Affixed to the side of the bath is a copper constant level overflow that maintains liquid at the same level as the surface of the sample. A water condenser is included so that the complete test can be run without adding water.

• *(788F)* **Spectroscope** being offered for the first time this month by the Meyer Scientific Supply Co., Inc., of

**Do You Want More Information?**

CI has made it easy for you to learn more about any item described in this section. Simply encircle the product's identifying number on the Reader Service postcard inside the back cover.

# HOOKER MONOCHLOROACETIC ACID

## To Make Today's Products Better

Versatile Monochloroacetic Acid is aptly called "today's intermediate" because so many currently important products can be made from it.

That's why your choice of a source for this important chemical should be made carefully. As a major producer of Chlorine and chlorine products, Hooker has a fund of technical experience of great value in the production and the use of such products as this. In addition Hooker produces Monochloroacetic Acid in a new plant especially designed for the purpose. As a result, the Hooker product is of high quality, dependably uniform, and available in quantities that match your production needs.

Listed below are some of the characteristics of Hooker Monochloroacetic Acid. Technical Data Sheet 752-B gives more complete listing of physical and chemical properties. It will be sent you upon request made on your company letterhead.

### MONOCHLOROACETIC ACID

DESCRIPTION: White crystalline material with a strong sweetish odor. Corrosive to the skin. Very soluble in water and benzene; soluble in most organic solvents.

| | | | |
|---|---|---|---|
| Synonyms | Chloroacetic Acid, Chloroethanoic Acid | Boiling Point | 189°C |
| Formula | $CH_2ClCOOH$ | Solubility | |
| Molecular Weight | 94.5 | Water | Very soluble |
| Freezing Point | 61.6°C | Benzene | Very soluble |
| | | Other organic solvents | Generally soluble |

USES: Intermediate in manufacture of carboxymethylcellulose, 2,4-dichlorophenoxyacetic acid, cyanoacetate, indigoid and thioindigoid dyes, ammonium thioglycolate, thioglycolic acid, glycine and other chemicals of commercial importance. It has been suggested as a preservative alone or in connection with other compounds for hides, skins, etc.

*From the Salt of the Earth*

HOOKER ELECTROCHEMICAL COMPANY

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BENZOIC ACID • CHLOROTOLUENE • SODIUM BENZOATE • CAUSTIC SODA • MURIATIC ACID • PARADICHLOROBENZENE • CHLORINE

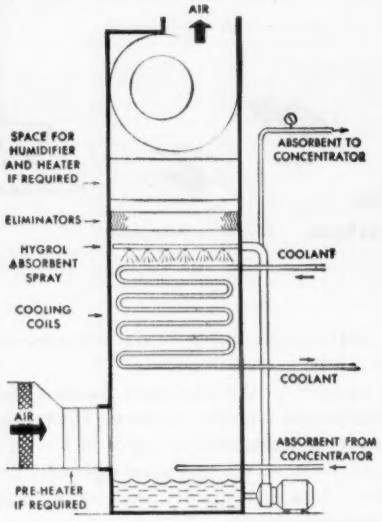
# New Method Gives Precise Control in Air Conditioning

## Niagara "Controlled Humidity Method" Uses Hygrol, Hygienic Liquid Absorbent

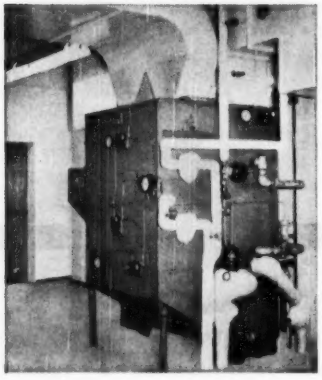
● The Niagara "Controlled Humidity Method" is a new system of air conditioning giving complete control of temperature and relative humidity, holding constant conditions or varying them at the will of the user. Especially, it provides dry air at normal atmospheric temperatures with little or no refrigeration required. A condition of 15 grains of moisture per pound of air at 85 deg. F. dry bulb temperature has been produced without refrigeration.

The apparatus is enclosed in a casing thru which the air is drawn by fans. The air is filtered and then enters a chamber where it is dehumidified in passing thru a spray of "Hygrol" Liquid (a hygienic hygroscopic chemical that absorbs the air-borne moisture and contains no salts or solids to precipitate) In the same chamber are located cooling coils which remove the latent heat of evaporation and also sensible heat as required.

The absorbent liquid spray falls into a tank at the base, where it is piped to a concentrator, removing moisture taken from the air. The re-concentrated liquid returns to the system. This process is continuous, and the apparatus operates at full capacity at all times.



NIAGARA CONTROLLED HUMIDITY METHOD — FLOW DIAGRAM



The same equipment may be used to provide winter air conditioning when required, by installing a tempering coil at the outdoor intake, an humidifier, and a reheat coil above the eliminators.

This equipment is manufactured in a range of sizes providing from 1000 to 20,000 CFM of conditioned air from a single unit, and mutiple unit installations are practical. It is expected that, by reducing the need for refrigeration, the cost of air conditioning will be reduced by this method. Applications generally are in a temperature range from 35 deg. F. upward. Below the freezing temperature of water, the Niagara "No-Frost" method is applicable.

The equipment is protected by U. S. and foreign patents. Installations have been made in food and chemical process industries, in packaging hygroscopic products, for preventing condensation of moisture on metals and other products in storage, in air conditioning for laboratory control and for human comfort.

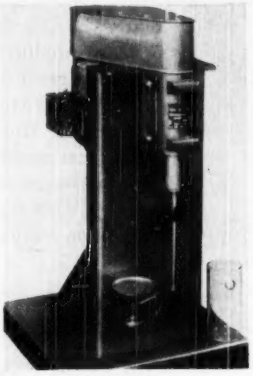
For further information, write Niagara Blower Company, Dept. CI, 405 Lexington Ave., New York 17, N. Y.

**LABORATORY EQUIPMENT——**

221 Atlantic Avenue, Brooklyn 2, N. Y., permits laboratory personnel to analyze for 33 elements in a matter of several minutes. Called the Todd Spectranal, the apparatus requires only a few milligrams of sample and it enables an immediate positive visual detection without many of the inconveniences of older type instruments.

The method is simple, rapid and suitable for macro or microanalysis. Designed so that the element is excited by controlled voltage and amperage through two platinum electrodes in a glass condenser chamber, the instrument obviates the need for cool gas flames, hot arc or spark excitation. The sample is nearly completely recovered after analysis eliminating loss of costly samples.

### *Latex Tester* *(790A)*



***The Precision mechanical stability latex test apparatus offered by Precision Scientific Co., Chicago 47, Ill., provides a standard apparatus for determining the mechanical stability of concentrated natural latices using a high-speed stirring technique.***

● *(790B)* Phillips Petroleum Co.'s **glass blowing laboratory,** located in Bartlesville, Oklahoma, is now offering a complete service for the fabrication, modification or repair of those glassware items of unusual or intricate design which are not otherwise readily available. The laboratory is equipped to manufacture such glass structures as vacuum tubes, pumps, columns, stills, condensers, and micro distillation apparatus. Facilities include a glass blowing lathe, annealing furnace, high vacuum and silvering equipment. Each finished piece is checked for strains by polariscopic examination after annealing, to afford the maximum protection against structural weakness developed during manipulation.

# For Figuring High Temperature Applications of Stainless Steel...

## ELEVATED TEMPERATURE PROPERTIES

of Type 321
Titanium Stabilized Austenitic
Chromium Nickel Steel

| | TEMP. °F | STRESS-PSI |
|---|---|---|
| Creep: 1%—10,000 hrs. | 1100 | 16,000 |
| | 1200 | 11,000 |
| | 1300 | 7,000 |
| Stress for Rupture in 1000 hrs. | 1100 | 32,000 |
| | 1200 | 21,000 |
| | 1300 | 12,000 |

## A.I.S.I. type 321

Titanium stabilized stainless steel offers many competitive advantages at a substantial saving in cost compared to other types of stabilized stainless. The excellent high temperature properties, shown here, are an example. Alloys of Titanium used in making type 321, are made at Niagara Falls from U.S. ores. This assures the user a plentiful supply of type 321 stainless steel.

TAM does not make or supply steel of any kind. But, as developers of titanium alloys such as 25% and 40% Low Carbon Ferro Titanium required in making 321, we can furnish much worthwhile data. Write our New York office.

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## Dimethyl Ethanolamine

$CH_3$
$CH_3$ $\rangle NCH_2CH_2OH$

**For use as pharmaceutical intermediate**—many of the effective anti-histamines now being sold are synthesized from Dimethyl Ethanolamine.

**For preparation of finishing agents,** anti-static agents, acetate rayon gas-fading resists, and other processing assistants for the textile industry.

**For an effective corrosion inhibitor**—concentration of *less than* 0.1 per cent maintains constant alkalinity in return condensate steam systems. The pH of 0.1 per cent solution is about 10.2.

**For surface-active esters**—well suited to cationic flotation processes.

**For water-resistant floor polishes**—the fatty acid soaps of Dimethyl Ethanolamine are excellent wax emulsifiers. In addition, they minimize discoloration of linoleum and form a water-resistant film.

# MAP YOUR ROAD TO BETTER PRODUCTS AND GREATER PROFIT WITH THESE AMINES

## Diethyl Ethanolamine

$C_2H_5$
$C_2H_5$ $\rangle NCH_2CH_2OH$

**For textile processing**—esters of Diethyl Ethanolamine made with fatty acids are used to emulsify oils and waxes to be applied under acidic conditions—as in water-proofing of textiles. Water-soluble quaternary salts of these esters are of value as textile softeners and as surface-active materials.

**For pharmaceuticals**—Diethyl Ethanolamine is a good starting point for production of esters of therapeutic value.

**For water-resistant floor polishes**—fatty acid soaps of Diethyl Ethanolamine, like those of Dimethyl Ethanolamine, are good wax emulsifiers for water-resistant floor polishes.

**For preparation of oil-soluble esters** used as surface-active materials in inks and paints.

## Methyl Diethanolamine

$CH_3N\langle CH_2CH_2OH$
$CH_2CH_2OH$

**For textile agents and dyestuffs,** gas purification, germicides, and emulsifying agents. A tertiary amine with two highly active (OH) groups, this compound is a convenient starting point for production of useful pharmaceuticals.

**For more information** on these three amines, write or phone the nearest Carbide and Carbon Chemicals office. Other amines produced by CARBIDE are described in the free booklet "Nitrogen Compounds"—when writing ask for Form 4770A.

## CARBIDE AND CARBON CHEMICALS DIVISION

**Union Carbide and Carbon Corporation**

**30 East 42nd Street** UCC **New York 17, N. Y.**

Offices in Principal Cities

In Canada:

Carbide and Carbon Chemicals, Limited, Toronto

# BOOKLETS AND BULLETINS

## *Chemicals*

**Industrial Chemicals** . . . . . (793A)
94-p. catalog of industrial chemicals listing specifications, properties, and packing and shipping regulations for 136 products. Dow Chemical Co.

**Copper Ores** . . . . . (793B)
8-p. technical publication dealing with current reagent practice on copper ores. American Cyanamid Co.

**Cellulose Esters** . . . . . (793C)
59-p. publication intended as a laboratory manual for those interested in using cellulose esters. Gives detailed information on uses, specifications and compatibility with solvents, resins and plasticizers. Tennessee Eastman Corp.

**Metal Strippers** . . . . . (793D)
4-p. illustrated booklet describing strippers for removal of synthetic organic coatings from metals. Enthone, Inc.

**N-Chlorosuccinimide** . . . . . (793E)
Technical bulletin giving specifications, uses and handling information. Arapahoe Chemicals, Inc.

**1, 4-Butanediol** . . . . . (793F)
8-p. data bulletin giving properties, characteristics, uses and handling information. General Aniline and Film Corp.

**Sodium Aluminate** . . . . . (793G)
Booklet describing use of sodium aluminate in the treatment of industrial and municipal water supplies. Monsanto Chemical Co.

**Organic Specialties** . . . . . (793H)
Catalog of surface active agents and organic chemical specialties. Alrose Chemical Co.

**Ethylene Oxide** . . . . . (793 I)
16-p. booklet dealing with technical data on ethylene oxide including material on unloading, storage and handling. Union Carbide and Carbon Corp.

**Stymer S** . . . . . (793J)
Illustrated booklet containing technical information on application of Stymer S, a synthetic size for synthetic warps. Monsanto Chemical Co.

**Vinsol Resin** . . . . . (793K)
12-p. technical booklet describing use for Vinsol resin in Buna-N cements and adhesives. Hercules Powder Co.

**Fine Chemicals** . . . . . (793L)
5-p. catalog and price list of fine chemicals. Krishell Laboratories, Inc.

**Organic Chemicals** . . . . . (793M)
30-p. price list of more than 2400 organic chemicals. The Matheson Co.

**Tackifiers** . . . . . (793N)
Bulletin describing tackifier resin emulsions for natural and neoprene rubber latices. American Resinous Chemicals Corp.

**Solvents** . . . . . (793O)
Bulletin containing details on performance studies of Celanese solvents in nitrocellulose formulations. Celanese Corp. of America.

**Wetting Agents** . . . . . (793P)
Technical bulletins on wetting agents in shampoos and textile applications. The Atlantic Refining Co.

**Plasticizer** . . . . . (793Q)
5-p. bulletin describing monomeric ester type plasticizer of higher molecular weight. Deecy Products Co.

**Carboxymethylmercaptosuccinic** . . . . (793R)
4-p. brochure containing specifications, reactions, uses, and price of the acid. Evans Chemetics, Inc.

**Caustic Soda** . . . . . (793S)
6-p. booklet dealing with advantages of purchasing high-concentration caustic soda and diluting immediately during unloading, thus saving freight costs. Fischer and Porter Co.

**Specification Chemicals** . . . . . (793T)
Card giving latest information concerning specification chemicals for the government and its contractors. American Chemical Paint Co.

**Sodium Cellulose Sulfate** . . . . . (793U)
Booklet containing complete information on properties, chemistry, toxicity, and uses. Tennessee Eastman Corp.

**Plasticizers** . . . . . (793V)
Product specifications for Pycal line of plasticizers. Atlas Powder Co.

**Stabilizers** . . . . . (793W)
Technical report on stabilizers and lubricants for plastics containing information on the properties and applicability for polyvinyl chloride plastics. Witco Chemical Co.

**Stearates** . . . . . (793X)
Technical Report on metallic stearates for the protective coatings industries. Witco Chemical Co.

**Lead Naphthenate** . . . . . (793Y)
Bulletin covering the properties of 24% lead naphthenate which are especially important to the paint industry. Witco Chemical Co.

**Resorcinol** . . . . . (793Z)
6-p. bulletin on the use of resorcinol in fiber reinforced rubber. Koppers Co., Inc.

**Research Chemicals** . . . . . (793AA)
Price list of over 30 fine and research organic chemicals in laboratory and commercial quantities. Farchan Research Laboratories.

**Driers** . . . . . (793BB)
Price list of standard products including driers, fungicides, paste mixing and milling aids, and specialties. Nuodex Products Co., Inc.

**Fine Chemicals** . . . . . (793CC)
Wholesale price list of fine organic chemicals. Mann Fine Chemicals, Inc.

**Specialties** . . . . . (793DD)
10-p. list of chemical specialty products. Advance Solvent and Chemical Corp.

**Chemicals** . . . . . (793EE)
6-p. booklet describing major Oronite products in commercial manufacture. Oronite Chemical Co.

**Phosphates** . . . . . (793FF)
23-p. booklet on phosphates, phosphorous compounds, formates and oxalates in various industrial applications. Victor Chemical Works.

**Chemical Products and Services** . . . (793GG)
Booklet describing such products as silica gel, catalysts, silicofluorides, casting compounds, inorganic acids and research and development services. The Davison Chemical Corporation.

**Free Copies . . .**

of these booklets and bulletins are easy to obtain. Simply encircle the proper number on the Reader Service postcard inside the back cover. A few publications are marked with asterisks, and these you must request from the firms involved on your own company letterhead.

## *Equipment*

**Air Filter** . . . . . (793HH)
Bulletin describing corrosion resistant combination air filter and reducing valve. Conoflow Corp.

**Flow Regulator** . . . . . (793 II)
Bulletin No. 502 describing direct acting, self contained apparatus to regulate flow volume. W. A. Kates Co.

**Vapor-Proof Pump** . . . . . (793JJ)
Catalog sheet on vapor-proof pump for 50 gallon drums which features corrosion resistant plastic coated fabric diaphragm. Bishman Manufacturing Co.

**Air Locks** . . . . . (793KK)
2-p. bulletin describing air locks and trip master controls for holding regulating and control valves during air supply failure. The Swartwout Co.

**Tachometer** . . . . . (793LL)
Booklet describing redesigned hand tachometer which gives machine speeds, speed variations and belt slippage. O. Zernickow Co.

**Tachograph** . . . . . (793MM)
Booklet describing portable speed recording instrument. O. Zernickow Co.

**Shipping Drums** . . . . . (793NN)
Bulletin devoted to light-weight fibre shipping drums. Continental Can Co.

**Processing Equipment** . . . . . (793OO)
16-p. bulletin detailing equipment for processing liquids, powders, granulars and light pastes. The J. H. Day Co.

**Filters** . . . . . (793PP)
Bulletin describing filters for various specialized applications, e.g. petroleum products and compressed air. Fulflo Filters. Commercial Filters Corp.

**Speed Changers** . . . . . (793QQ)
4-p. bulletin describing miniature speed changers having higher ratios, precision gears, and zero backlash. Metron Instrument Co.

**Laboratory Glass** . . . . . (793RR)
Brochure describing history, personnel and products of the Scientific Division of Kimble Glass. Owens-Illinois Glass Co.

**De-ionizers** . . . . . (793SS)
Bulletin describing portable de-ionizers for laboratory and pilot-scale application. Illinois Water Treatment Co.

**Vibration Conveyor** . . . . . (793TT)
Bulletin No. 950 dealing with balanced-vibration type conveyor making use of natural frequency vibration. Stephens-Adamson Mfg. Co.

**Swivel-Piler** . . . . . (793UU)
Technical bulletin describing portable swivel-piler on wheel mount for repiling bulk materials. Stephen-Adamson Mfg. Co.

**Equipment** . . . . . (793VV)
4-p. index of equipment and descriptive bulletins, arranged according to application and alphabetically. Schutte and Koerting Co.

**Welding** . . . . . (793WW)
26-p. article, The Aircomatic Welding Process discusses the fundamentals of metal-arc transfer in inert gas-shielded arc welding. Air Reduction Co., Inc.

MAIL COUPON BELOW

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REMOVES THE TAINT OF SMELLY PAINT!...

No longer does the freshly decorated home have to reek of paint and its odorous solvents. Perfume chemists have developed aromatic deodorants that completely blanket the foul-smelling ingredients used in certain types of paint. Our PAINT DEODORANT #5 accomplishes this effectively and economically. And for other industrial odor problems, we have equally good deodorizing specialties. Use the coupon below for specific details.

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☐ FUEL OIL ☐ LUBRICATING OILS
☐ SPRAYS ☐ WAXES ☐ PLASTICS
☐ RUBBER ☐ LATEX ☐ LEATHER
☐ PAINTS or LACQUER ☐ TEXTILES
☐ ROOM or ☐ HOSPITAL DEODORANTS
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## BOOKLETS AND BULLETINS——

**Flow Equipment** ..... (794A)
23-p. booklet describing material flow equipment, including construction features, application tips, and specification charts. The Rapids-Standard Co., Inc.

**Exhauster** ..... (794B)
16-p. bulletin giving specifications and capacity tables for type AE exhauster. Robinson Ventilating Co.

**Diaphragm Control Valves** ..... (794C)
Bulletin describing series 1200 and 1400 diaphragm control valves. Kieley and Mueller.

**Instrumentation** ..... (794D)
Data sheet entitled Continuous Record of Electrical Power Increases Central Station Efficiency, describing methods for rapid measurement of useful power to prevent overloading of generators. Minneapolis-Honeywell Regulator Co.

**Shipping Bags** ..... (794E)
Brochure illustrating various types of shipping sacks and noting company's services. Kraft Bag Corp.

**Electronic Instruments** ..... (794F)
Bulletin describing series 500 Strip-Chart Dynamaster Electronic Instruments, giving information on functions of the instruments for recording and indicating. The Bristol Co.

**Tiering Truck** ..... (794G)
Bulletin describing straddle type electric tiering truck for handling double-faced pallets. Lyon-Raymond Corp.

**Portable Conveyor** ..... (794H)
8-p. bulletin No. 374 covers the complete range of heavy duty portable conveyors including fields of use and products handled. Barber-Greene Co.

**Metallizing** ..... (794I)
Bulletin describing the process for making mechanical repairs and protecting surfaces from corrosion. Metalweld, Inc.

**Chemical Feeders** ..... (794J)
11-p. bulletin devoted to chemical feeders with discussions of features, special control, arrangement and installation. Omega Machine Co.

**Boiler** ..... (794K)
12-p. brochure describes new steam generating unit, completely shop assembled for one-piece shipment. Babcock and Wilcox Co.

**Industrial Gages** ..... (794L)
Booklet illustrating various gages for different industrial applications. Jerguson Gage and Valve Co.

**Aluminum Finishes*** ..... (794M)
New edition of the process manual Finishes for Aluminum giving basic information on processes for applying surface finishes to aluminum and the characteristics of the finishes produced. Reynolds Metals Co.

**Speed Reducers** ..... (794N)
23-p. booklet detailing method of selection, horsepower rating tables, torque capacity tables, dimensions, order guide, etc., for parallel shaft and vertical right angle speed reducers. The Falk Corp.

**Sanitary Motor** ..... (794O)
Bulletin illustrating different types of the firm's new sanitary motors with details of major features. U. S. Electrical Motors, Inc.

**Handling Equipment** ..... (794P)
24-p. catalog covering the diversified line of corrugated steel boxes, skids, pallets and combination units of material handling equipment. The Union Metal Manufacturing Co.

**Rapid Mixer** ..... (794Q)
Technical supplement HM giving complete data on a rapid mix unit that performs uniform blending of a liquid and one or more chemicals or gases with fluid materials, without the use of a mixing tank. American Well Works.

**Zeolite Softener** ..... (794R)
Bulletin No. 4505 describes a water softening apparatus for small boiler and industrial plants, laundries, hospitals, etc., where relatively small quantities of softened water are required. Cochrane Corp.

**Filters** ..... (794S)
8-p. booklet on filters, giving information on sizes, capacities, motors, and construction materials. Titeflex, Inc.

**Tensile Testing Jaws** ..... (794T)
Bulletin giving specifications and improved features of new gripping jaws for tensile testing machines. Instron Engineering Corp.

**Heat Exchangers** ..... (794U)
16-p. catalog containing information on heat exchangers, evaporators, feedwater heaters, pressure vessels and pipe. American Locomotive Co.

**Grinding Equipment** ..... (794V)
17-p. booklet describing and illustrating the firm's line of grinding and mixing equipment. Bulletin No. 265. U. S. Stoneware Co.

**Pump** ..... (794W)
7-p. bulletin describing type GS pump having all parts except the casing in one easily replaceable rotor assembly. De Laval Steam Turbine Co.

**Steam Generator** ..... (794X)
14-p. illustrated booklet pointing out the advantages of the dual circulation steam generator over conventional boilers. Foster Wheeler Corp.

**Pressure Filter** ..... (794Y)
Bulletin describing applications, structural details, special features and variations of the Sweetland pressure filter. Oliver United Filters, Inc.

**Comminuting Machine** ..... (794Z)
Bulletin illustrating comminuting equipment for pharmaceutical and chemical applications. The W. J. Fitzpatrick Co.

**Homoloid Machine** ..... (794AA)
Bulletin describing homoloid machine, containing technical specifications and illustrations of all component parts. The W. J. Fitzpatrick Co.

**Demineralizers** ..... (794BB)
Booklet listing stills and demineralizing equipment with their special uses. Barnstead Still and Sterilizer Co.

**Water Bath** ..... (794CC)
Booklet outlining features of construction and giving specifications for water bath. Barnstead Still and Sterilizer Co.

**Laboratory Equipment** ..... (794DD)
Bulletin describing and illustrating unit assemblies for equipping industrial laboratories. Both wood and steel construction are offered. Hamilton Manufacturing Co.

**Rotary Mechanical Seal** ..... (794EE)
Booklet dealing with rotary mechanical seal designed to eliminate leakage and repacking necessary in conventional packed stuffing boxes on glass lined vessels with top-entering glass-coated agitators. Glascote Products, Inc.

**Steel Barrels** ..... (794FF)
Bulletin describing removable head seamless steel barrels made from a single sheet of pressed metal. Pressed Steel Tank Co.

**Gas Flow Counter** ..... (794GG)
Bulletin on model 200 gas flow counter of stainless steel finish. The instrument is windowless and contains a platinum anode and teflon insulator. Can easily be disassembled for cleaning and decontamination. Research Equipment and Service.

## DRYMET *

### THE ECONOMICAL DETERGENT SILICATE

Cowles DRYMET, anhydrous sodium metasilicate, is the most highly concentrated form of sodium metasilicate available. It is more economical to use, on the basis of both $Na_2O$ (alkalinity) and $SiO_2$ (silicate) than any other type of hydrated or anhydrous detergent silicate, either compounded or by itself. DRYMET contains no water of crystallization.

## DRYSEQ *

### THE ALL-PURPOSE DETERGENT SILICATE

Cowles DRYSEQ, anhydrous sodium sesquisilicate, is a medium pH alkaline cleaner which will do fast, dependable work at a low cost to the user. It is a white, free-flowing powder, quickly and completely soluble in hot or cold water—containing 56.75% $Na_2O$—making it an economical base material for compounding.

# Cowles CHEMICALS

## DRYORTH *

### THE HEAVY-DUTY DETERGENT SILICATE

Cowles DRYORTH, anhydrous sodium orthosilicate, is a powerful, speedy, heavy-duty cleaner with valuable penetrating and wetting-out properties, reinforced dirt-removing power and unusual emulsifying action. It is an anhydrous, free-flowing powdered silicate containing not less than 60% $Na_2O$, which may also be used as an economical constituent of high pH cleaning compounds.

## CRYSTAMET *

### THE MEDIUM pH DETERGENT SILICATE

Cowles CRYSTAMET is a pure, perfectly white, free-flowing granular pentahydrate sodium metasilicate with the normal 42% water of crystallization. Suggested for compounding when it is desirable to lower the concentration of a finished product. Readily soluble—chemically stable—easy to handle. Can be used on medium pH jobs.

*We'll be glad to send you our DRYMET File Folder containing complete technical information and suggested formulations.*

*REG. U. S. PAT. OFF.

**COWLES CHEMICAL COMPANY**

HEAVY CHEMICALS DEPARTMENT • CLEVELAND 3, OHIO

# the VACUUM PUMP that has NO MOVING PARTS

The steam jet type of vacuum pump has continually gained in favor for high vacuum in industrial process work. The total absence of moving parts is a big advantage and means many years of service, with no maintenance cost unless corrosive vapors are present. Available in single and multi-stage units for vacuum from a few inches down to a small fraction of 1 mm. Hg. absolute.

Many stills, dryers, evaporators, crystallizers and other processing vessels are operating at vacua limited by the vapor pressure of the condensate. This means on the average an absolute pressure of about 2.0" Hg. It is often practical and economical to put a Booster Evactor in the line between the vessel and the condenser and maintain an absolute pressure of 0.5", 0.25" or even lower. The benefits of this higher vacuum in improving quality and capacity are very substantial.

Croll-Reynolds have been manufacturing this type of equipment for over 30 years and have made thousands of separate installations. Their engineers have extensive experience in applying it to numerous different processes. A catalog describing Croll-Reynolds equipment and service is available for the asking.

CROLL C-R REYNOLDS

**CROLL-REYNOLDS CO., INC.**

17 John Street, New York 7, N. Y.

CHILL-VACTORS STEAM JET EVACTORS CONDENSING EQUIPMENT



# GERSTHOFEN WAXES

(FORMERLY I. G. WAXES)

These high melting point waxes are free from impurities, have uniform specifications and offer you unique qualities that surpass the natural waxes. Nine types are available, one of which will surely meet your requirements. Their ability to improve quality, lower production costs, or both can be expected. Write for samples and information.

*Distributed thru*

George H. Lincks, Inc.

312 Bridge St., Brooklyn 1, N. Y.


## NEW TRADEMARKS——

*(Continued from page 768)*

(Symbol). For chlorinated lime for use as a disinfectant, etc., and sodium hypochlorite solution for use as disinfectant, etc. 575,935. Sinclair Mfg. Co.

**CARANDA.** For vegetable wax for general use. 576,642. Imex Corp.

**CARBACRYL.** For insecticides, rodenticides, fumigants, acaricides, herbicides, and arthropodicides. 577,027. American Cyanamid Co.

**GARVECOL.** For leather friction dressing. 582,077. Garvecol Co.

**PROLAN.** For insecticides. 588,554. Commercial Solvents Corp.

(Symbol). For stamp pads and rubber stamp ink. 533,295. Fulton Specialty Co.

**Rainchek.** For a liquid water repellent for masonry, etc. 530,565. Protection Products Mfg. Co.

**TENNANT.** For wax in bar form made of a combination of vegetable and petroleum wax used to wax floors by mechanical means. 557,227. G. H. Tennant Co.

**FLUSHING.** For ready-mixed paints. 567,323. Chilton Paint Co.

**pura suds.** For household washing preparation. 514,221. Phipps Products, Inc.

**MINIT-KOTE.** For liquid non-abrasive cleanpreparations for cleaning metal surfaces. 529,427. Klem Chemicals, Inc.

**BRISK.** For general cleaning compound for use in cleaning glass, enameled, porcelain, painted and similar surfaces, carpets, and rugs. 566,485. U. S. Sanitary Specialties Corp.

**VOGUE magic.** For white side-wall tire cleaner. 570,136. Vogue Rubber Co.

**STEVEX.** For automobile, etc. radiator cleaner. 573,991. Stet Chemical Co.

**Aqua Suds.** For liquid soap. 574,771. Hartman-Leddon Co., Inc.

**BROCADE.** For toilet soap. 576,987. Safeway Stores, Inc.

**VESPER.** For toilet soap. 576,988. Safeway Stores, Inc.

**COQUITO.** For soap. 578,613. Newell Gutradt Co.

**SAHARA.** For waterless hand soap. 578,652. Sahara Waterless Soap Co.

**MILRAY.** For detergent used for laundering clothes and other washing purposes. 579,339. Economy Specialty Co.

**MIRRAY.** For detergent used for laundering clothes and other washing purposes. Economy Specialty Co. 579,341.

**BRISK.** For cleaning compound having water softening qualities. 580,568. Antiseptol Co. Div. W. F. Straub & Co.

**CIBA.** For cleaning, cleansing, and detergent chemical compounds in liquid, powder or paste form of general utility. 580,921. Ciba Ltd.

**CIBA.** For cleaning, cleansing, and detergent chemical compounds in liquid, powder, and/or paste form of general utility. 580,922. Ciba Ltd.

**Formula 40.** For soap. 583,862. Colgate-Palmolive-Peet Co.

**TREMENDSO.** For chemical detergent in powder form for use in washing machines. 584,351. John Sexton & Co.

**RUSH.** For soap. 587,370. M. Werk Co.

**"ICE DESTROY."** For chemical preparation for melting ice. 529,241. Chemical Development Corp.

**SAFE STEP.** For self-polishing liquid wax. 529,263. Floors, Inc.

*From Official Gazette—Vol. 637, No. 4*

**STIKOTINE.** For liquid adhesive cement. 566,308. Julian R. Cloutier.

**Tumble Bug.** Insecticide. 562,730. Residex Corp.

**NEMAFUME.** For soil fumigant. 573,832. Eston Chemicals, Inc.

**EXSTRONG.** For printing and lithographic inks. 583,187. Barta-Griffin Co.

**RUBBERTRED.** For porch and deck paint, ready for use. 527,955. Minnesota Paints Inc.

**GRANITOID.** For prepared or ready-mixed liquid paint enamels, varnish satins and similar materials. 535,542. J. F. Kurfees Paint Co.

**GIT PAINT & VARNISH REMOVER.** For liquid paint and varnish remover. 537,398. Arrow Products Corp.

**TRIAD.** For protective coatings for covering paint spray booths, paint racks, etc., against splashed, oversprayed, or similar excess paint or water in painting, or washing operations, masking materials for such use, and chemical paint removers. 546,975. Detrex Corp.

**MONSANTO.** For coating compositions in the nature of lacquers, enamels, paint type fillers, emulsions and paints in paste form. 554,909. Monsanto Chemical Co.

**STRATOLAC.** For synthetic resin coating compositions. 554,914. Monsanto Chemical Co.

**TWIN COLOR.** For ready-mixed paints for interior use. 561,334. Patterson-Sargent Co.

**Mallinckrodt.** For flatting agent used as an ingredient of paints, varnishes, and lacquers. 568,647. Mallinckrodt Chemical Works.

**BEETSOL.** For waterless hand cleanser. 582,659. Sugar Beet Products Co., Inc.

FROM SHELL CHEMICAL

# ALLYL ALCOHOL

$CH_2=CH-CH_2OH$

## ...in tank cars and drums

**Here are typical reactions of Allyl Alcohol that may suggest ways through which you can accomplish useful chemical syntheses:**

**Reactions involving THE DOUBLE BOND**

- Polymerization → Homopolymers; Linear copolymers*; Cross-linked copolymers*
- Halogens ($X_2$) → $CH_2(X)-CH(X)-CH_2OH$
- Amines ($RNH_2$) → $CH_2(RNH)-CH_2-CH_2OH$

**Reactions involving THE HYDROXYL GROUP**

- Organic Acids (RCOOH) → $CH_2-CH(OOCR)-CH_2OOCR$
- $CS_2$ and KOH → $KS-C(=S)-O-C_3H_5$
- $H_2S$ → $CH_2-CH(SH)-CH_2SH$

**Reactions involving BOTH FUNCTIONS**

- Oxidation → 3(HCOOH)
- Rearrangement → $CH_3-CH_2-CHO$
- Alkylation($C_6H_6$) → $CH_3-CH(C_6H_5)-CH_2C_6H_5$

*Linear copolymers with mono-allyl esters, styrene and other singly unsaturated compounds; cross-linked copolymers with di- and tri-allyl esters of di- and tri-basic acids and with drying oils.

A 96-page book which summarizes the known properties and uses of Allyl Alcohol will be mailed upon receipt of your letterhead request. Samples of Allyl Alcohol for evaluation are available.

**PHYSICAL PROPERTIES**

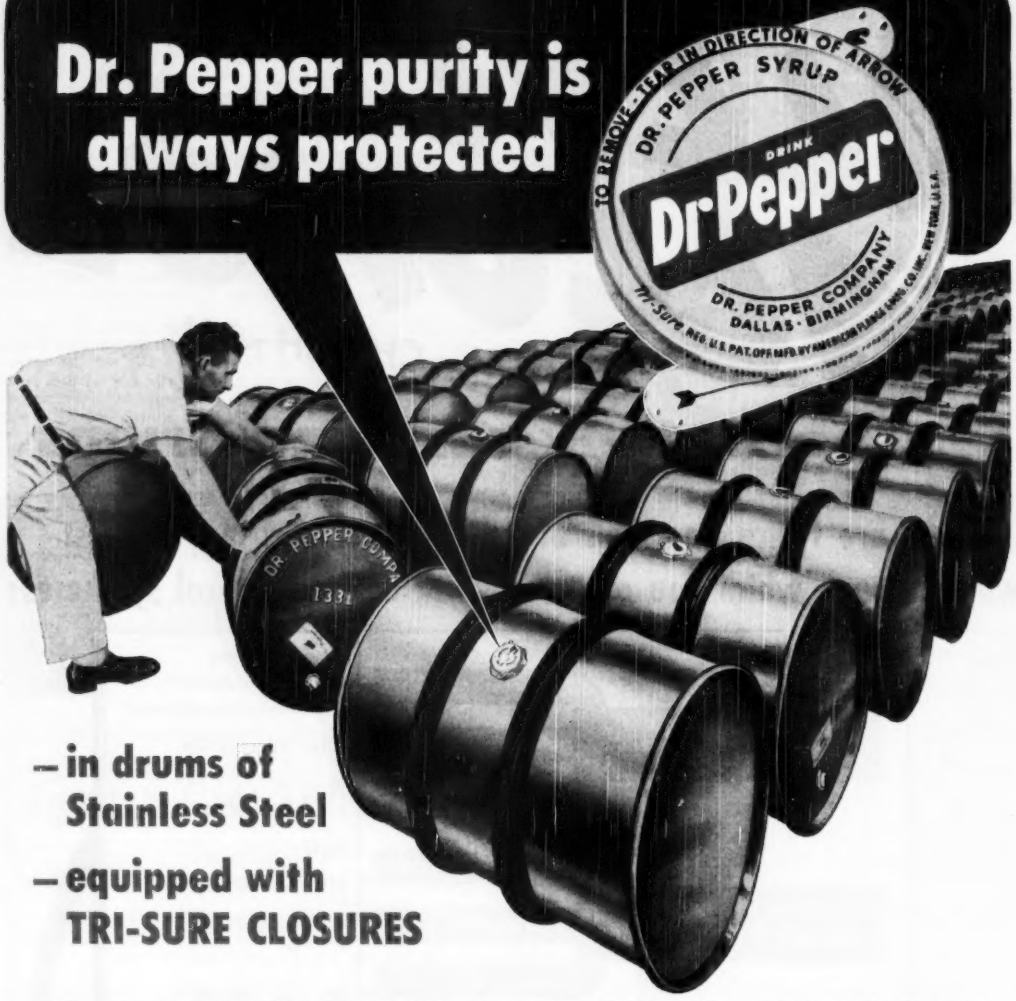
| | |
|---|---|
| Specific Gravity, 20°/20°C | 0.8535 |
| Boiling Point, 760 mm | 96.9°C |
| Flash Point, Tag open cup | 90°F |
| Tag closed cup | 72°F |

**SHELL CHEMICAL CORPORATION**

Eastern Division: 500 Fifth Avenue, New York 18 • Western Division: 100 Bush Street, San Francisco 6

Los Angeles • Houston • St. Louis • Chicago • Cleveland • Boston • Detroit • Newark

# Dr. Pepper purity is always protected




## —in drums of Stainless Steel

## —equipped with TRI-SURE CLOSURES

Dr. Pepper syrup is shipped to 440 bottlers in all sections of the United States. And to *protect* the purity of every gallon, the Dr. Pepper Company uses only *stainless steel* drums—equipped with *Tri-Sure Stainless Steel Closures**.

Just as stainless steel provides drums that are easier to clean, sterilize and handle, Tri-Sure Closures *keep* the contents secure from leakage, tampering and contamination.

Like other shippers to whom *product purity* is paramount, the Dr. Pepper Company standardizes on Tri-Sure Closures because the *flange* is integral with the drumstock . . . the *plug* screws securely into the flange . . . and the leak-proof *seal*, made of 195-lb. plate, prevents undetected tampering.

Give this protection to *your* product—eliminate risks in *your* shipments—by specifying "Tri-Sure Closures" when you order drums.

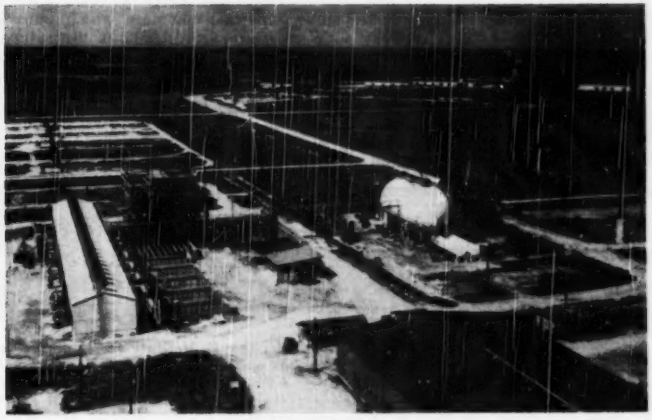
Tri-Sure
CLOSURES

*The "Tri-Sure" Trademark is a mark of reliability backed by 28 years serving industry. It tells your customers that genuine Tri-Sure Flanges (inserted with genuine Tri-Sure dies), Plugs and Seals have been used.

**AMERICAN FLANGE & MANUFACTURING CO. INC., 30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.**

**TRI-SURE PRODUCTS LIMITED, ST. CATHARINES, ONTARIO, CANADA**

# NEWS OF THE MONTH



*Newly completed ammonia plant of Dow Chemical Co. at Freeport Texas. The plant will produce refrigeration grade and technical grade anhydrous ammonia.*

## *New Construction*

• **Third quarter price and wage increases,** coupled with armament-related purchasing of basic construction materials, have combined to advance The Austin Co.'s quarterly index of industrial building costs to 175 (1926=100). This compares with the postwar low of 161 reached in October, 1949, at which level the Austin index was stabilized for 12 months as the result of rising efficiency and declining job overhead that offset progressive increases in other cost factors during that period.

According to George A. Bryant, Austin president, many suppliers and sub-contractors are now refusing to do business without escalator clauses to protect them if their costs increase, and a growing number of trades are demanding special allowances over their published rates to compensate for travel time. Such factors, plus the possibility of freight rate increases and the certainty of higher taxes after the first of the year, indicate that prices will go higher before they again stabilize.

• **Continental Oil Black Co.,** recently organized by Continental Carbon Co. and Continental Oil Co., will begin construction immediately on a $1½-million plant at Lake Charles, La. The unit, scheduled for completion early in 1951, will produce 5 million pounds annually of high abrasion furnace black from oil. Raw material for the plant will be piped direct from Continental Oil's refinery, and a portion of the output will be funneled into the expanded synthetic rubber production along the Gulf Coast. The Witco Chemical Co. will distribute the plant's production.

### *CI Goes Weekly in January*

Chemical business men can look for faster coverage and analysis of chemical processing industries news in January, 1951. That's when CHEMICAL INDUSTRIES becomes a weekly chemical news magazine.

As in the past, CI will emphasize new developments and interpret their economic effects on all phases of the chemical industry. It will continue to report news of products and processes; news of people and companies; news of the current market scene and its relation to the long trend; and news of laws, labor and finance that have special meaning for the chemical business man.

• **A $1-million laboratory** has been opened at Wilmington by Du Pont for research and development work on photographic films and processes. Primary research objectives are improvements in color photography, better properties and performance in motion picture film, new development processes for both black and white and color film and better products for the X-ray and graphic arts field.

• **Phillips Chemical Co.** will soon begin construction of an additional plant for the production of Philblack O, high abrasion furnace carbon black. The plant, scheduled for completion in late 1951, will be built adjacent to the present Philblack A and Philblack O plants near Borger, Texas.

Present plant capacity is approximately 90 million pounds per year. The new unit, plus improvements now in progress, will raise overall capacity to about 160 million pounds per year.

• **New facilities** for production of acetate staple fiber are being erected at Celanese Corp.'s Rock Hill, S. C., plant. Service facilities for increased chemical operations are also being provided. At present, the plant produces acetate filament yarn only.

• **Engineering work has begun** on a battery of 29 new chemical-recovery coke ovens for Alabama By-Products Corp. at its Tarrant, Ala., plant. The battery—to be completed within a year—will consist of 29 Koppers Becker type ovens, underfired with coke oven gas. At 20 hours coking time, they will produce 150,000 tons of coke annually. Koppers Co. holds the construction contract.

• **An expansion which will increase** its west coast production of chlorine and caustic soda one-third is being undertaken by The Dow Chemcal Co. at its Pittsburg, Cal., plant. No new buildings will be required, but existing chlorine-caustic cells will be enlarged and new boiler and substation equipment installed.

• **Construction is under way** on a new alkyd plastic molding compounds plant near Toledo. O., for the Plaskon Division, Libby-Owens-Ford Glass Co. It is expected that production will begin by March, 1951.

• **Du Pont's** new $20-million plant for the production of Orlon acrylic fiber was recently dedicated at Camden, S. C. During the ceremonies, which were held at the Camden armory, Crawford H. Greenwalt spoke on the value to the nation of an expanding economy.

• **Globe Auto Glass Co.,** Chicago, is building a safety glass processing unit where a high pressure autoclave process will be used to cure the glass and set the resin bond. Construction contract has been awarded to Chemical Plants Division, Blaw-Knox Co.

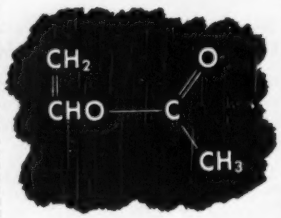
• **Equipment to trap about 90% of the fly ash** and soot discharged from boiler house stacks is being installed

# NIACET

TRADE-MARK

## UNPOLYMERIZED VINYL ACETATE

(STABILIZED)




**BOILING RANGE**
**71.8° to 73°C.**

Vinyl Acetate can be polymerized to form resins with exceptional bonding qualities for wood, glass, metal and fibre.

Vinyl Acetate can be used for synthesis of a-b-dichloroethyl acetate, b-monochlor ethyl acetate, b-chloro acetals, 2-aminothiazole, chloroacetaldehyde and many others.

***Containers:* —**

**410 lb. drums**

**62,500 lb. tank cars**

NIACET
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at Du Pont's Belle, W. Va., plant. The project, which will cost more than $1½ million, calls for installing dust collectors on each of the 18 boilers there.

• **Weyerhaeuser Timber Co.** plans to increase the capacity of its kraft mill at Longview, Wash., from 220 tons per day to about 400 tons per day. Arrangements will be made so the mill can produce either bleached sulphate pulp or board. Project should be completed by 1952.

### *Washington*

• **The Bureau of Mines** has reopened the Amarillo, Texas, helium plant for a limited production, due to increasing demands for helium for both military and civilian uses. During the fiscal year 1950, consumption reached 63,311,000 cubic feet and the estimates for the current fiscal year indicate about 80 million cubic feet will be needed. Part of the increased civilian demand for helium in peacetime is attributed to the wartime development of a method for welding magnesium.

The Amarillo plant has been in complete standby status since September, 1946. The Bureau's Excell, Texas, plant, rated capacity of 60 million cubic feet of helium annually, has supplied all needs of Federal agencies and private consumers.

• **The Economic Cooperation Administration** has published a 25-page booklet, "Guide for the Prospective American Importer," designed to assist businessmen in gathering adequate information on foreign trade, making correct policy decisions on matters involving importing, and formulating plans for engaging in importing enterprises. Copies may be obtained from the Office of Information, ECA, 800 Connecticut Ave., Washington 25, D. C.

• **The National Production Authority** is setting up some 20 Government industry advisory committees to study the need for allocation and priority regulation of short-supply chemicals. Each committee will be composed of about 20 top industry representatives, and a special effort will be made to see that small chemical producers are fully represented.

Chlorine is one of the first scarce chemicals to be studied. Glycerine and benzene are also due for close checking.

### *Foreign*

• **One of Asia's greatest chemical works** has been wiped out by United Nations bombers during the Korean war. The fertilizer, carbide and explosives plants at Konan (Hungnam) on the east coast of North Korea were strategic targets for B-29s and for Navy carrier based dive bombers.

Engineers of the Shin Nippon Nitrogenous Fertilizer Co., Ltd., the Japanese company which built and operated these plants until Japan's defeat in World War II, estimate that 90 per cent of the facilities are destroyed. Reconstruction will cost well over $100,000,000.

***Jerome F. McGinty (left), named vice president of Millmaster Chemical Corp., and Maynard C. Wheeler, elected to Commercial Solvents Corp.'s board of directors. Mr. McGinty has been secretary for Millmaster. Mr. Wheeler is vice president in charge of production for Commercial Solvents.***

• **A newly organized Brazilian company,** Companhia Brasileira de Plastico "Koppers", plans to construct a polystyrene plant near Sao Paulo in cooperation with the Chemical Division of Koppers Co. Koppers will furnish much of the plant equipment, and will provide engineering and technical advice in the construction and operation.

The new company has contracted with Koppers to purchase styrene monomer, the basic ingredient in making polystyrene. It is expected that the plant will produce 3 million pounds of polystyrene annually. It will carry on the compounding and coloring of the plastic as well as the actual manufacture of the material.

• **Experiments recently carried out** at the Forest Research Institute, Dehra Dun, India, have shown that paper mulberry wood is a promising source for the manufacture of newsprint. Results of a trial run were considered satisfactory, and experiments are being continued to improve quality.

Newsprint is not manufactured in India. The first factory is under construction in Madhya Pradesh.

• **Australian Paper Manufacturers Ltd.** report encouraging results from work on dissolving pulps from eucalypt, the Australian hardwood. A rayon tire yarn has been spun in England from pulp so produced. The company has cooperated on this development with the technical staff of Courtaulds Ltd. and hopes to be able to meet the English rayon firm's pulp requirements by the time its

***Another new development in***

**B. F. Goodrich Chemical Company** ***materials***

# Important Announcement!

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- In addition to use in emulsion or aqueous solution polymerization, it can also be used as a monomer or comonomer in polymerization conducted in organic solvents, or in bulk polymerization.
- It can be used to modify many types of thermosetting resins.
- Being "dry", it greatly facilitates preparation of salts of acrylic acid, both metallic and ammonium.
- Many addition reactions with the double bond of acrylic acid are facilitated by anhydrous conditions.
- It is more stable during shipment and storage than the water solution.

For further information, and prices for Good-rite glacial acrylic acid, please write Department CD-1, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco.

**B. F. Goodrich Chemical Company** A DIVISION OF THE B. F. GOODRICH COMPANY

GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers

projected rayon tire yarn plant is completed.

• **Nissin Chemical Co.,** Osaka, Japan, has signed a contract with Chemical Construction Corp., New York City, covering engineering designs for a modern urea plant to be located at an existing plant site of the Nissin Co.

The Nissin Co. is one of the largest chemical producers in Japan and was formerly known as the Sumitomo Chemical Co., Ltd.

## *General*

• **The Manufacturing Chemists' Association, Inc.** has opened an office at 330 West 42 Street, New York, under the direction of Robert L. Taylor, executive vice-president. This is in addition to the Association's present offices in the Woodward Building, Washington, D. C.

Activities of the new office will be devoted initially to public relations matters and the servicing of member needs and Association affairs in the New York area.

• **The Society of the Plastics Industry** recently held a conference at Swampscott, Mass., in cooperation with the Harvard Graduate School of Business. Harvard professors conducted sessions on labor and pensions, production, executive development, management problems, industrial marketing and advertising.

• **Armour Research Foundation,** Registry of Rare Chemicals, 35 West 33 St., Chicago 16, Ill., has added the following to its list of wanted chemicals:

Zinc ammonium nitrite
Cuprous acetate
Molybdenum silicide
Barium ferrocyanide
Silver chlorate
Potassium hexaniobate
Tetracosane
alpha-Bromoisocaproyl bromide
Hemimellitic anhydride
Vinyl fluoride
2,3-Dichlorodiphenyl amine
2-Methyl-5-n-butylpyridine
Chloropentofluoroethane
Methylene fluoride
Norephedrine
6,7-Dichloro-9-ribityl isoalloxazine
D-Epigalactose
Vulbocapnine
Galactoflavin

## *Company Notes*

• **Adams-Henry Chemical Co.** has been organized by John F. Henry and Halstead J. Adams for the sale and distribution of industrial and fine chemicals, intermediates and dyestuffs. The new offices are at 32 Broadway, New York City.

• **Hilton-Davis Chemical Co.** Division, Sterling Drug Inc., is now working on a noise abatement program at its Cincinnati plant. Mufflers are being installed on the plant's steam jet exhausts which must be constantly operated. The program is part of a plan to cut down nuisances, chiefly possible sources of air and water pollution.

• **First of a series of "open house" days** for families of employees of B. F. Goodrich Chemical Co.'s Geon plant, Louisville, Ky., were held recently. The company hopes to promote better understanding of employees' jobs by their families with this program. It plans to start similar programs at its Avon Lake and Niagara Falls plants.

• **Hilton-Davis Chemical Co.** Division, Sterling Drug, Inc., has appointed Vilar Brothers y Mejia, Mexico City, as agent for its dyestuffs and intermediates in Mexico. Juan B. Vilar is in charge for Hilton-Davis.

• **Fritzche Brothers, Inc.,** has moved its San Francisco office to 395 Monadnock Building, 681 Market St.

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Wetting and rewetting agent for insecticides and textiles.
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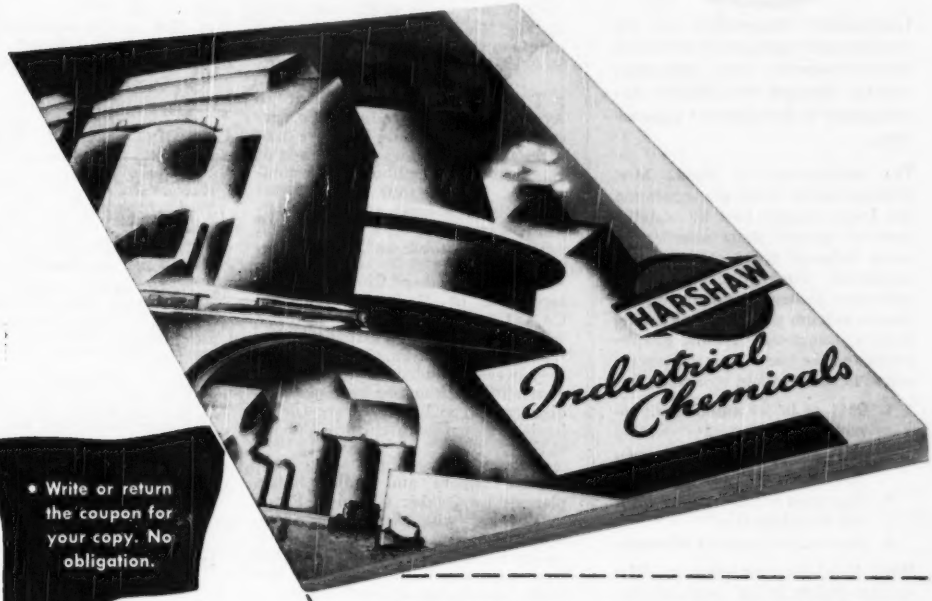


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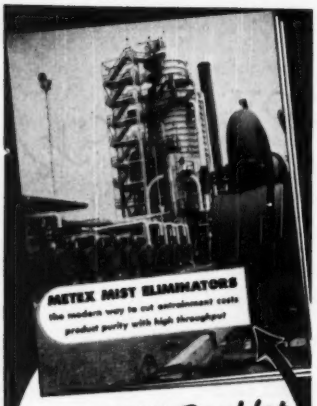


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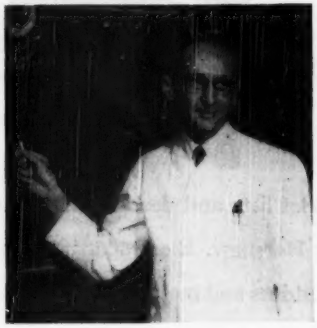

***William S. Haldeman (left), professor of chemistry at Monmouth College, Ill., who has received the 1950 Midwest Award of the American Chemical Society; and Henry Eyring, dean of the University of Utah Graduate School, who has been presented the William H. Nichols Medal of the New York section, ACS. Professor Haldeman is the first person to receive the Midwest Award for contributions in the field of education, rather than research. Dr. Eyring was selected to receive the Nichols Medal because of his contributions to the field of theoretical chemistry.***

• **Mathieson Chemical Co.** reports net earnings of $2,086,466 for the third quarter of 1950—the highest for any like period in the company's history. Net earnings for the first nine months of 1950 amounted to $6,496,551.

• **The Hammond, Ind., plant** of American Maize-Products Co. recently held open house for more than 5,000 guests—families and friends of employees and neighbors of the community. Guided tour included the pilot plant, special starch department, warehouse, corn elevators, oil refinery, mill house and table house.

• **The Cleveland and Cincinnati sales territories** of Monsanto Chemical Co.'s Organic Chemicals Division will be established as a separate districts, effective Jan. 1. Previously they were included in the Detroit district. Branch managers of the new districts will be T. C. Tupper—Cleveland—and J. C. Hutchison—Cincinnati.

• **New boilers and boiler house** planned by Quaker Chemical Products Corp. will almost triple the boiler capacity now available. The boiler house will be completed before the end of this year, and the boiler installation by early 1951.

• **New sales office** for the General Electric Co.'s Chemical Department has been opened in the Shoreham Building, 806 Fifteenth St., N.W., Washington, D. C.

• **Felton Chemical Co., Inc.,** New York, has opened a new office and salesroom in Dallas, Texas, at 209 North Hawkins with Herbert D. Berger in charge.

• **American Cyanamid Co.** has granted 13 post graduate fellowships and one post doctoral fellowship in the fields of chemistry and chemical engineering for 1950-51. Each post graduate fellowship provides $1200 plus $300 or the student's full tuition, whichever is larger. The post doctoral fellowship provides $3000.

## CALENDAR *of* EVENTS

*AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE,* annual meeting, Cleveland, O., Dec. 26-30.
*AMERICAN CHEMICAL SOCIETY,* New York Section, symposium on radio-isotopes, Hotel Statler, New York City, Jan. 19.
*AMERICAN INSTITUTE OF CHEMICAL ENGINEERS,* annual meeting, Columbus, O., Dec. 3-6.
*AMERICAN MANAGEMENT ASSOCIATION,* Biltmore Hotel, Los Angeles, Cal., Jan. 15-18.
*AMERICAN PHARMACEUTICAL MANUFACTURERS ASSOCIATION,* mid-year meeting, Waldorf-Astoria, New York City, Nov. 27-29.
*CHEMICAL SPECIALTIES MANUFACTURERS ASSOCIATION,* annual meeting, Hotel New Yorker, New York City, Dec. 4-5.
*COMPRESSED AIR AND GAS INSTITUTE,* Westchester Country Club, Rye, N. Y., Dec. 11-12.
*SOCIETY OF COSMETIC CHEMISTS,* fall meeting, Biltmore Hotel, New York City, Dec. 6.
*SOCIETY OF PLASTICS ENGINEERS,* seventh annual national technical conference, Hotel Statler, New York City, Jan. 18-20.
*SYNTHETIC ORGANIC CHEMICAL MANUFACTURERS ASSOCIATION,* annual dinner, Hotel Commodore, New York City, Dec. 13.

## PEOPLE

### *Company Officers*

• Harry Kline, Detroit, manager and technical director of the Phenolic Plastics Division, **Reichhold Chemicals, Inc.,** and T. S. Hodgins, Seattle, manager of Reichhold's Pacific Northwest Division, have been elected vice presidents of the com-

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"High-white" Carbose D is more than a builder. If a given amount of detergent is partially replaced with a builder, the detergency generally decreases. But if it is replaced with Carbose D, the detergency generally increases — frequently to an amazing degree. As little as 1% of "high-white" Carbose D added to a synthetic detergent can increase soil removal and whiteness retention properties by 20 to 80%.

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pany, in charge of their respective divisions.

***Lyman H. Allen, Jr. (left), appointed chief engineer of Foster D. Snell; and B. H. Carr, named special representative to South America by Dow Chemical Co. Mr. Allen has been chief design engineer for American Viscose Corp.***

• Evans Research and Development **Corp.** has elected S. F. Coneybear and E. C. Kenton vice presidents. Mr. Coneybear for the past five years has been development manager of the corporation. Mr. Kenton has been responsible for government research. Both will continue to serve in their present capacities.

• Robert H. Evans has been appointed executive assistant to the president and executive committee of **Olin Industries, Inc.** He resigned his positions as secretary, treasurer, and director of the Riegel Paper Corporation to accept his new duties.

• William J. Dechert and Nelson H. Zeigler have been appointed vice presidents of The Sydney Ross Co.; George V. Harley, vice president of Sterling Products International, Inc. (Del.), and Anton D. Reiners, vice president of Sterling Products International, Inc. (N. J.). These companies, subsidiaries of **Sterling Drug, Inc.**, are engaged in foreign trade.

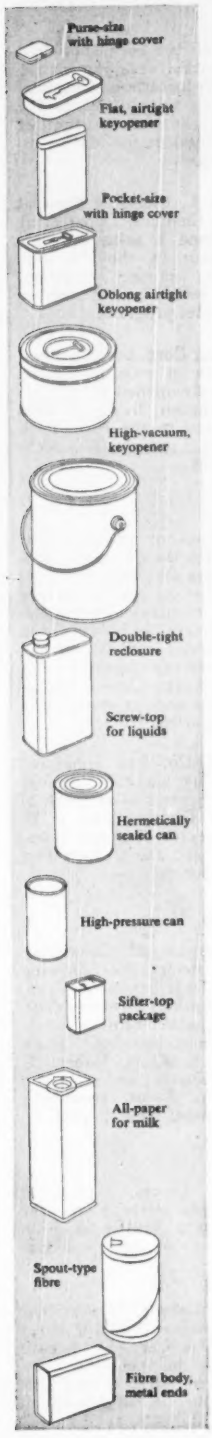
## *Production*

• John H. Baker has been appointed as general superintendent of **Pennsylvania Salt Mfg. Co.** of Washington's western manufacturing operations. He has been superintendent of the Tacoma, Wash., plant since 1928.

• R. K. Mueller has been named assistant general manager of the Plastics Division of **Monsanto Chemical Co.** He joined the Plastics Division in 1946 and became production manager in 1949.

• Eugene S. Barclay, **Sharp & Dohme, Inc.**, has been appointed assistant to the director of Biological and Sterile Pharmaceutical Production. He joined Sharp & Dohme in 1939 after three years with United Engineers and Construction.

**WHICH PACKAGE SUITS YOUR PRODUCT?**



**Attached cover,** smooth edges, snaps closed with bead lock giving rigidity to top surface with no distortion. Opens, closes with one hand. Can be coated inside, body, top and bottom if desired.
**Contents** readily accessible as top swings back and provides completely open container. Top aperture is wide enough to permit user to reach in with fingers and pick out contents. Comes in four sizes.

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**This container** is most familiar as the package for short lengths of adhesive tape used for minor cuts and bruises.

Notice that the hinged snap-top opens easily, protects the contents from dust . . . that the package makes a nice display and keeps clean after handling.

Perhaps you are packaging cold tablets, salt tablets, rubber bands, nails, nuts, bolts, playing cards, king-size cigarettes, whole spices, notions, buttons, *or some other small item used in small quantities.*

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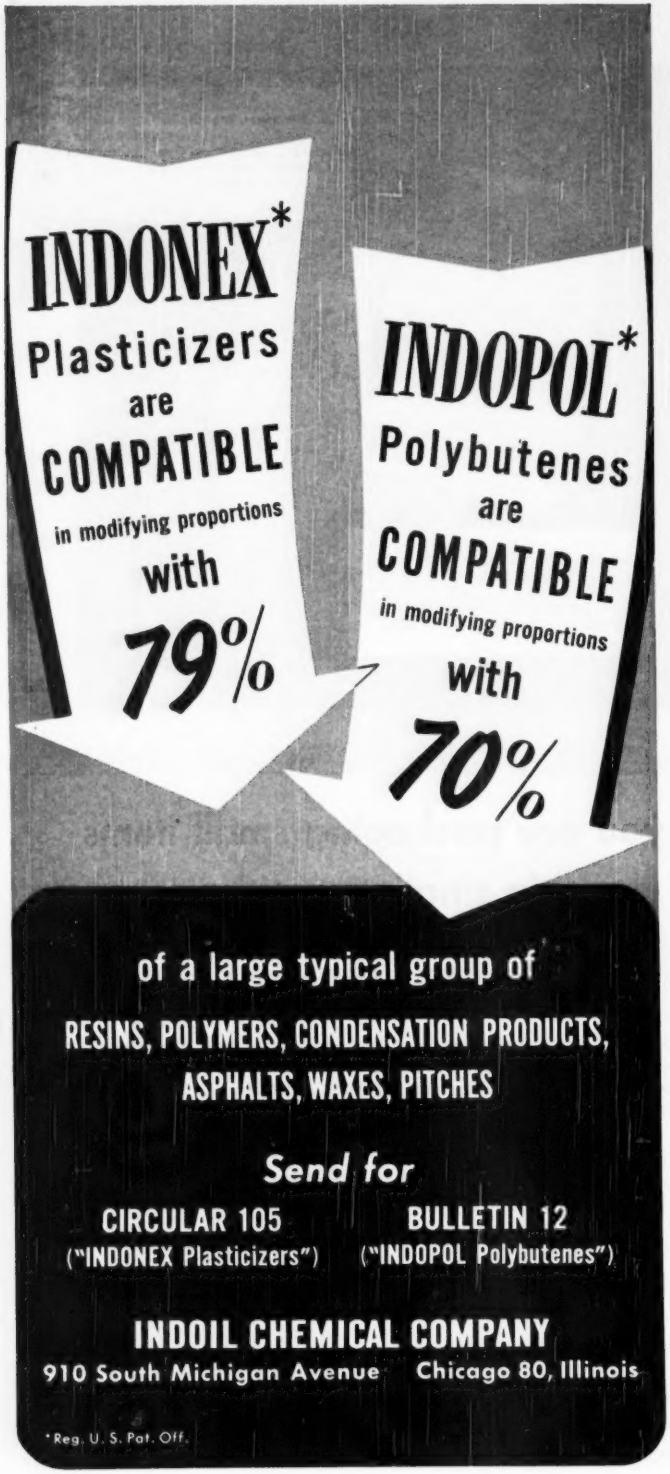




### *Sales*

• L. E. Russell has been appointed director of market development for **Mathieson Hydrocarbon Chemical Corp.** Prior to his transfer to the new company, he was manager of product development for Mathieson Chemical Corp.

• Constantine L. Chase of **General Electric Co.'s** Chemical Department has been named a sales development supervisor in the Phenolic Products Sales section. He joined the company in 1947, as a member of the Chem-Met program.

• **Dow Corning Corp.** has appointed Earle J. Smith as manager of the company's newly-opened branch office in Washington, D. C. In 1946 he was assigned to the New York office of Dow Corning as a technical consultant.

### *Research*

• Gilbert Thiessen, former technical advisor for the Chemical Division of **Koppers Co., Inc.,** has been named manager of the laboratory section of the company's central Research Department. In his new post, he will supervise and direct all Koppers laboratory research performed in company-owned laboratories or plants and by contract in outside laboratories.

• **Armour & Co.** has appointed E. E. Hays as assistant general manager and director of research of the Research Division and J. D. Porsche as director of research and development at the Thirty-first Street Laboratories.

### *Associations*

• **The Association of Consulting** Chemists has elected the following officers: president, Erwin Di Cyan, Di Cyan and Brown; vice president, Earl D. Stewart, director of research, Schwarz Laboratories, Inc.; treasurer, Robert S. Aries, Robert S. Aries and Associates; and secretary, Albert Parsons Sachs, consulting chemical engineer, New York City.

### *Died*

• **Arthur W. Dawes,** 71-year-old dean of chemists at the Rensselaer plant of General Aniline & Film Corporation, at his home on October 10.

• **Berthold A. Ludwig,** 79, president of National Aniline Division, Allied Chemical & Dye Corp. for twenty years prior to his retirement on October 1, 1950, after a long illness on October 8 at Westfield, New Jersey.

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GENERAL DYESTUFF CORPORATION

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Extensive research facilities have always supported each of these former divisions. Through the amalgamation, the research and service facilities are infinitely strengthened — to an extent that must benefit all present customers of either firm.

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NOTE: The Dyestuff Division will continue to operate as before, without change in personnel or policy.

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# CHEMICAL MARKETS

### *Acetate Plastics Booming*

The shortage of styrene plastic materials, caused by demand for styrene by the synthetic rubber program have moved up production of acetate plastic materials, which can be injection molded in polystyrene equipment, into he highest ground since the spring of 1947. Production in July of this year was at 9,638,000 pounds, an annual rate of about 115 million pounds. It is not believed, however, that production can go much higher until supply bottlenecks for acetic acid, cellulose and acetone can be removed.

### *New Record Set for Rubber Consumption*

Consumption of new rubber during August reached a new record total of 112,602 long tons according to The Rubber Manufacturers Association. This tonnage was 8⅛% higher than the July consumption of 103,946 tons and exceeded the previous record established in June 1950 by about 0.5%.

Natural rubber used amounted to 63,741 long tons, 5.54% higher than July when 60,394 tons were consumed. The August consumption also exceeded the June consumption of 63,333 long tons.

Use of synthetic rubber was up more sharply to 48,861 long tons, an increase of 12.19% over July consumption of 43,552 and about 0.5% higher than the June use of 48,608 tons.

For the first eight months in 1950, the rubber manufacturers have used 815,593 long tons of new rubber 23.32% higher than the comparable period in 1949 when consumption of new rubber amounted to 661,385 tons. Of the 1950 total to date 486,626 tons were natural rubber and 328,967 tons were synthetic.

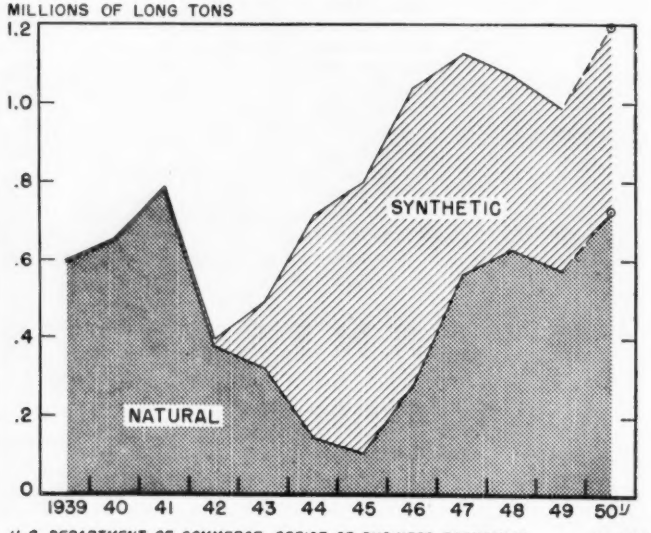
Consumption of reclaimed rubber was estimated at 24,164 long tons in August against 22,307 tons in July and 25,253 tons in the month of June.

The changing pattern of sales (synthetic vs. natural) can be seen from the graph below.

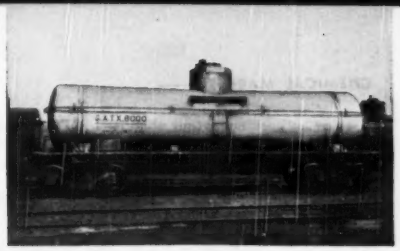
### *Natural Gas Reduces Coke Chemicals' Supply*

Extension of natural gas lines to areas now served with coke-oven gas is expected to reduce the Nation's production of coke and coal chemicals according to a Bureau of Mines report. This conclusion reached after a canvass of all gas utilities producing coke-oven gas, merchant coke plants, and merchant pig-iron plants, which produce nearly 20% of the Nation's coke.

Replies were received from all of the concerns. Five plants and one battery of ovens at another plant, operated in 1948, expect to close as soon as natural gas is introduced—probably within five years. They operate 310 ovens with an annual capacity of 1,298,400 tons of coke, and actually produced about 1,285,371 tons, or about 2 per cent of the national production of oven coke, in 1948. However some of the ovens might be sold to and operated by other interests.




U. S. DEPARTMENT OF COMMERCE, OFFICE OF BUSINESS ECONOMICS 50-256



The first aluminum tank car ever built was produced by General American in 1928. It was GATX 8000—built specifically for Glacial Acetic Acid.

# GATX *aluminum cars for chemicals*

modern **GATX** aluminum cars now carry:

**Glacial Acetic Acid • Formaldehyde**
**Hydrogen Peroxide Bleach • Fatty Acids**
**Acetic Anhydride • Naphthenic Acid**
**Butylaldehyde • Water White Rosin**
**Glycerin • Nylon Salt Solution**
**52% Hydrogen Peroxide • Nitrogen Fertilizer**
**Oleic Acid • Nitric Acid**
**Trichlorobenzene • Ammonium Nitrate**

Bulk shipping keeps pace with chemical progress

***why aluminum cars?***

**Before GATX 8000, the action of many ladings damaged and corroded tank cars; or the lading itself was contaminated by iron "pick-up."**

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Four other operators, whose 271 ovens have an annual capacity of 1,219,000 tons of coke, doubted their ability to replace worn-out ovens if they lose their city-gas contracts. It is possible, the report says, that within 10 years 592 ovens with a capacity of 2,547,000 tons of coke a year—3% of the Nation's current coke-making capacity—may close down because of the substitution of natural gas for coke-oven gas.

## *Paint Raw Materials Short*

A recent survey by the National Paint Varnish and Lacquer Association provides a quick roundup on the availability of the raw materials for production of paints, varnishes and lacquers.

• *Titanium Pigments.* Demand in excess of productive capacity. Quota distribution is being used by suppliers.

• *Glycerine.* Demand much greater than supply. Producers started on quota distribution.

• *Resins.* Supplies of resins in general are tight, largely due to glycerine shortage.

• *Phenolic Resins.* Just about meeting demand. Backlog of deliveries will be relieved with increased output in next 30 to 45 days. Polystyrene supply picture is getting worse because of benzol, but meeting current demands.

• *Lacquer Solvents.* Ethyl alcohol very scarce because of molasses and unable to meet demand. Acetone in tight supply. Other active and latent solvents just about meeting demand and no surpluses. Deliveries subject to voluntary allocation.

• *Drying Oils.* Linseed in good supply. Current minimum prices for CCC stocks not to be reduced through January 1, 1951. Tung oil in good supply. Import quantities are greater this year.

• *Containers.* One gallon pails extremely tight. Suppliers refusing to fill orders they believe unjustified by past experience. Five-gallon pails extremely tight. Military orders for food containers reduce supply of plate for regular trade. Heavy military orders for petroleum and chemcial products in 5-gallon pails and for Blitz cans causing shortage of 24 and 22 gauge cold rolled steel for normal uses.

## *Market Review*

**Top market news of the month** was the advance of sulfur prices from $18 to $22 per ton. Continually decreasing reserves have made it necessary that new, previously marginal sulfur supplies be brought into use. This price increase is equivalent to an increase of about $1.50 per ton in the price of sulfuric acid.

**Sodium tripolyphospate** moved from $7.40 to $7.50 per hundredweight while dibasic sodium phosphate moved from $6.90 to $7.00 per hundredweight, presumably reflecting increased raw material prices, particularly soda ash.

**Soap lye glycerin** prices contniued to move upward—to 55¢ per pound. Continually advancing prices for and short supplies of this product are calling for more production capacity by synthesis from petroleum. Problem: an equally short supply for chlorine.

**The supply of virtually** all coal tar-based chemicals was tight with the single exception of napthalene. But the price of napthalene crude advanced a cent per pound from 4¼ cents. At the same time pyridine moved from 80¢ to 90¢ per pound.

**The price of allyl starch** took another drop of seven cents per pound, from 58 cents to 51 cents for the solid material.

**Other companies** have joined in the vinyl resin price rise, up to 36¢ per pound, noted last month.

**Gum turpentine** prices plummeted almost as rapidly as they soared. In a two-month period the price increased from 49¢ per gallon to 68¢. However, during the first part of this period the price advanced to a high of 87¢ and then dropped almost as precipitously to the current level. Those in the trade attributed these rapid fluctuations to a market trying to find a level where demand will balance the current short supply.

**In keeping with the hard market** in practically all heavy chemicals the price of borax has been advanced $2 per ton to $33.25 and boric acid $2.50 per ton to $89.25 per ton. Sodium sulfate has moved from $15 to $17 per ton while sodium bisulfite skipped from $3.90 to $4.05 per hundredweight.

**Other metal salt** price increases include potassium permanganate from 21¾¢ to 22½¢ per pound, lead arsenate from 26½ to 28 cents per pound, copper cyanide from 15¢ to 17¢ per pound. Iodine moved from $1.53 to $1.72 per pound, maleic acid from 30¢ to 32 cents, fumaric acid from 30¢ to 33¢ per pound, and 18° muriatic acid from $1.90 to $2.05 per hundredweight.

# Alkyl Phenol C-9

*Jefferson's new chemical* { *intermediate* / *stabilizer* / *plasticizer* }

**Properties of Jefferson Alkyl Phenol C-9 indicate a wide range of application as**

1. an intermediate for non-ionic detergents
2. a stabilizer for ethyl cellulose
3. a plasticizer for cellulose esters
4. an intermediate for other plasticizers
5. a starting material for production of lubricating oil additives and rubber chemicals
6. an antioxidant

*A typical description of Jefferson Alkyl Phenol C-9 is:*

| | |
|---|---|
| Specific Gravity, 20/4°C | 0.949 |
| Hydroxyl Number | 255 |
| Color, Pt-Co Scale | 200 |
| Refractive Index, 20°C | 1.5140 |
| Flash Point (TOC), °F | 300 |
| Distillation Range, °C (Modified ASTM) | |
| IBP | 290.0 |
| 5 ml. | 293.0 |
| 50 ml. | 295.0 |
| 95 ml. | 296.5 |
| EP | 298.0 |

You may secure technical information and experimental samples for research and product development by writing (on your company letterhead, please) to our Market Development Division, Department B.

*Compressor piping frames this picture of a Jefferson ethylene unit (purification section) at Port Neches, Texas.*

**Jefferson Chemical Company, Inc.**

711 FIFTH AVENUE, NEW YORK 22, N. Y.

**ESSENTIAL CHEMICALS FROM HYDROCARBON SOURCES**

ETHYLENE OXIDE
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# Briefs

## *From recent literature*

**Non-volatile solvents** which enable insecticidal resins and cyclohexenone synergists for such resins to be used together in an effective state of solution may be made from sodium salts of alkyl phenols and 2,2'-dichlorodiethylether.

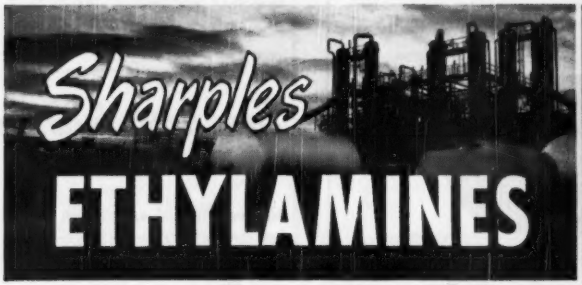
**High melting synthetic waxes** have been prepared by the reaction of long chain alkyl phenols with 1,4-dichlorobutane. Such waxes are compatible with other waxes, such as beeswax and petroleum waxes, and may be used in combination with them to raise their melting points.

**Surface active agents** made from alkyl phenols and ethylene oxide tend to be viscous and can be more easily purified in dilute aqueous solution. The agent can be recovered as a concentrated solution by heating the dilute solution to cause a phase separation. The composition of the phases is related to heating temperature, which is usually about 100° C. Use of the aqueous phase as the diluent for additional unpurified product makes possible recoveries of nearly 100%.

**Lubricating greases stabilized** against oxidation as well as oil separation and structural breakdown are obtained by the addition of a small amount of condensation product of formaldehyde and higher fatty acid esters of an alkyl phenol with a side chain of 4 to 12 carbon atoms.

***These developments are abstracted from recent publications or U. S. patents. The uses may suggest other applications of Jefferson Alkyl Phenol C-9 in your products or processes.***

**DOUBLE CHECKED ✓ from RESEARCH to INDUSTRY**




# ETHYLAMINE
# DIETHYLAMINE
# TRIETHYLAMINE

## *Present and Suggested Uses:*

| Application | ETHYLAMINE |
|---|---|
| AGRICULTURE | Preparation of dry salt of 2,4-D Acid |
| CERAMICS | Deflocculating agent for increasing strength of clay bodies |
| EMULSIONS | Intermediate for fatty acid soaps to be used as emulsifiers |
| INTERMEDIATE | in Organic Synthesis |
| PAPER | Intermediate for softening and flame-proofing agent |
| PETROLEUM | Solvent extraction<br>Preparation of amides for refining lubricating oil<br>Preparation of complex salt with CuCl for recovery of diolefins |
| PHARMA-CEUTICALS | Intermediate for medicinals |
| PHOTOGRAPHIC | Synthesis of photographic chemicals |
| PLASTICS | Condensing agent and intermediate for resins<br>Preparation of amides (plasticizers) |
| RUBBER | Synthesis of vulcanization accelerators<br>Stabilizer for latex |
| SOLVENT | Selective solvent for petroleum<br>For wide range of organic compounds |
| STABILIZER | For rubber latex |
| TEXTILES | Synthesis of dyestuffs<br>Synthesis of surface-active agents<br>Synthesis of sizing compounds |

| Application | DIETHYLAMINE |
|---|---|
| AGRICULTURE | Solubilizing Agent for 2,4-D Acid<br>Preparation of dry salt of 2,4-D Acid<br>Solubilizing Agent for 2,4,5-T Acid<br>Intermediate for Insecticides |
| ENAMELS | Anti-livering Agent |
| INTERMEDIATE | in Organic Synthesis |
| PETROLEUM | Solvent extraction<br>Preparation of amides for refining lubricating oil<br>Preparation of complex salt with CuCl for recovery of diolefins<br>Synthesis of gasoline stabilizer |
| PHARMA-CEUTICALS | Intermediate for medicinals<br>Preparation of vitamin derivatives |
| PLASTICS | Preparation of amides (plasticizers)<br>Synthesis of resins for coatings |
| RUBBER | Synthesis of vulcanization accelerators<br>Stabilizer for latex |
| SOLVENT | Selective solvent for petroleum<br>For wide range of organic compounds |
| STABILIZER | For rubber latex |
| TEXTILES | Synthesis of dyestuffs<br>Synthesis of surface-active agents<br>Synthesis of sizing compounds |

| Application | TRIETHYLAMINE |
|---|---|
| AGRICULTURE | Solubilizing Agent for 2,4-D Acid<br>Solubilizing Agent for 2,4,5-T Acid |
| ENAMELS | Anti-livering Agent |
| INTERMEDIATE | In Organic Synthesis |
| PETROLEUM | To improve recovery of catalyst in fluid cracking. |
| PHARMA-CEUTICALS | Intermediate for germicides (quaternaries)<br>Production of penicillin |
| SOLVENT | For wide range of organic compounds<br>Catalytic solvent in chemical synthesis |
| STABILIZER | For certain chlorinated hydrocarbons |
| TEXTILES | Preparation of quaternary ammonium compounds<br>Synthesis of waterproofing materials |

## OTHER SHARPLES ALKYLAMINES

Butylamines

Isobutylamines Propylamines

Isopropylamines

*Samples and prices are available from Dept. A*

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# NEW U. S. PATENTS

**A complete digest of recently issued patents of special interest to the chemical process industries, conveniently categorized by major fields.**

**Printed copies of patents are available from the Patent Office at 25¢ each. Address the Commissioner of Patents, Washington, D. C., for copies and for general information concerning patents or trademarks.**

*U. S. Patents from Official Gazette—Vol. 635, No. 1 (June 27) and Vol. 636, Nos. 1, 2, 3 (July 4-18)*

## *Petroleum*

**Preparing stable aluminum base lubricating greases** of smooth texture—combining unfinished Venezuelan distillate mineral oil of lubricating oil viscosity (containing polar compounds) with finished Coastal oil as a diluent and aluminum soap of substantially saturated fatty acids within the range of 12 to 22 carbon atoms as a thickener, heating and thereafter rapidly cooling in thin layers, accompanied by mechanical working. 2,514,311. Standard Oil Development Co.

**Anti-friction bearing lubricating grease** consisting of a mineral base lubricating oil thickened with a mixed-barium soap of fatty acid having an average of less than 18 carbon atoms. 2,514,330. Standard Oil Development Co.

**Substantially solid grease type lubricating composition**—a mineral base lubricant of grease consistency, containing finely divided silica having an average particle size of not more than 100 millimicrons, the composition including alkaline earth metal soap and having water resistant properties. 2,514,331. Standard Oil Development Co.

**In separating a mixture of two hydrocarbons** having the same degree of saturation by a granular adsorbent, the improvement comprises first adding to the mixture a third hydrocarbon having not more than one double bond per molecule more than the starting hydrocarbons, passing the resulting mixture in liquid phase through the adsorbent, thereby selectively adsorbing one of the starting hydrocarbons relative to the other, and separating from the adsorbent a filtrate fraction containing the starting hydrocarbons in a substantially altered proportion. 2,514,580. Sun Oil Co.

**Lubricating oil**—a major amount of an oxidizable lubricating oil and an amount (sufficient to inhibit oxidative deterioration) of an aliphatic sulfur-containing product produced by heating sulfur or selenium with a dialkyl sulfide. 2,514,625. California Research Corp.

**Preparation of a concentrate** containing a metal sulfonate dissolved in a lubricating oil by extracting a petroleum lubricating oil stock; sulfonating with fuming sulfuric acid or sulfur trioxide; adding a volatile hydrocarbon diluent and separating the resulting sludge; neutralizing by means of an inorganic compound of the desired metal and separating a sulfonate concentrate from the neutralized product. 2,514,733. Union Oil Co. of Calif.

**Catalytic conversion of hydrocarbons** with a liquid catalyst comprising hydrogen fluoride and titanium tetrafluoride. 2,514,866. Phillips Petroleum Co.

**Stabilized lubricant**—an oleaginous polymer having recurring units of the general configuration —[O-R]— wherein R is an alkylene hydrocarbon radical, and a polynuclear phenol. 2,514,982. Shell Development Co.

**Removing sulfur** and its compounds from a non-aromatic hydrocarbon fraction by contacting the sulfur-containing fraction with a poly-olefin glycol. 2,514,997. Standard Oil Development Co.

**Lubricating composition** consisting of a major proportion of a waxy mineral lubricating oil and a pour depressing amount of a long chain aliphatic naphthalene derivative reacted with a phosphorus- and halogen-containing compound in the presence of a Friedel-Crafts catalyst. 2,515,015. Standard Oil Development Co .

**Hydrocarbon oil,** resistant to foaming, consisting of a hydrocarbon oil and an organo-silicon-phosphorus condensation product. 2,515,024. Gulf Research & Development Co.

**Regeneration of hydrocarbon conversion catalyst** with an organic solvent containing as a detergent a petroleum sulfonate of sodium, potassium, calcium, or barium. 2,515,062. Sinclair Refining Co.

**Nonfoaming compositions** consisting of a mineral lubricating oil containing organic ester additives which tend to cause excessive foaming upon heating and/or working, and a substantially oil-insoluble highly fluorinated aliphatic hydrocarbon having 5 to 50 carbon atoms. 2,515,115. Standard Oil Development Co.

**Composition** consisting of a waxy mineral lubricating oil having dissolved therein a pour depressing amount of a Friedel-Crafts condensation product of a sulfurized highly chlorinated paraffin wax with naphthalene. 2,515,129. Standard Oil Development Co.

**Lubricating grease** consisting of a liquid oily lubricant thickened to a grease-like consistency with metal soap of aliphatic fatty material; a resinous, oil-soluble condensation product of diisobutyl phenol and a formaldehyde reacted with a nitrogen base; and phenyl beta-naphthylamine. 2,515,133. Standard Oil Development Co.

**Selective solvent separation of unsaturated hydrocarbons** with an aqueous solution of a water-soluble silver salt and an organic amine salt of an inorganic acid. 2,515,140. Shell Development Co.

**Preparation of a white oil** from a distillate oil which has been treated heavily with acid and which contains suspended sludge particles and soluble petroleum sulfonates, by adding a recycled refined oil product, separating sludge, neutralizing, treating the neutralized distillate with an aqueous alcohol solution to remove oil soluble sulfonate and steaming. 2,515,197. Standard Oil Development Co.

**Treating bentonite to stabilize its effect on the viscosity of water base well drilling mud** by dispersing in an alkali metal hydroxide solution and heating. 2,515,207. Phillips Petroleum Co.

**Solvent extraction process** for separating a mixture of liquefied butanes, butenes, and butadiene according to their degree of unsaturation. 2,515,217. Phillips Petroleum Co.

**Decarbonizing iron component synthesis catalysts** carbonized in the catalytic conversion of carbon monoxide with hydrogen—contacting with an oxidizing gas such as steam or $CO_2$ and an oxidizing atmosphere conducive to the oxidation of the iron component (in preference to the carbon) without substantial decarbonization; contacting the oxidized catalyst with a free oxygen-containing gas at relatively severe temperatures to burn off at least a substantial portion of said carbon. 2,515,245. Standard Oil Development Co.

**In preparing a phosphorus and sulphur containing lubricating oil addend** from turpentine the improvement comprises subjecting the turpentine prior to reaction to heating in the presence of metallic sodium and then distilling the reaction product, whereby the turpentine is rendered substantially free of oxygen-containing impurities reactive with phosphorus pentasulfide to produce compounds which have an objectionable odor. 2,515,281. Sinclair Refining Co.

**Catalytically converting hydrocarbon oils** by contact with a solid conversion catalyst in finely divided form. 2,515,369. M. W. Kellogg Co.

**Lubricant** for the lubrication of steam turbines for marine use—a mineral lubricating oil, a rust-inhibiting quantity of alkyl acid phosphate and an alkoxy aniline of the group consisting of anisidine and phenetidine. 2,515,520. Tide Water Associated Oil Co.

**Oil base drilling fluid** comprising an oil, a finely divided weight material, a settling inhibitor selected from calcium oxide and partially slaked calcium oxide, and an asphalt as a plastering agent. 2,515,742. Ernest F. Snyder.

**Lubricating grease composition** consisting of lubricating oil

thickened with metal soap of higher fatty acids and metal salt of a heterocyclic carboxylic acid. 2,516,136. Standard Oil Development Co.

**Preparing a lubricating grease** for high temperature use—combining acyclic aldehyde capable of undergoing the Cannizzaro reaction with an alkali to convert part of the aldehyde to a cyclic carboxylic acid salt and part to the corresponding alcohol; adding a saponifiable fatty material and a further quantity of alkali to form a soap and adding lubricating oil. 2,516,137. Standard Oil Development Co.

**Producing soap and metal furoate** lubricating grease compositions by drawing an effluent liquid containing furfural from a furfural solvent oil treating process; adjusting the furfural, saponifiable fatty material, and lubricating oil content to grease-forming proportions; adding a sufficient quantity of a saponifying base to convert said furfural to a furoate and furfuryl alcohol and to saponify the fatty material in the oil. 2,516,138. Standard Oil Development Co.

**Catalytic hydrogenation of an oxide of carbon.** 2,516,126. M. W. Kellogg Co.

**Absorption separation** process for hydrocarbons with a liquid hydrocarbon absorption oil. 2,516,507. Shell Development Co.

**Alicyclic monocarboxylates** in hydrocarbon extraction. 2,516,614. Shell Development Co.

**Composition** consisting of a mineral lubricating oil which is susceptible to deterioration when exposed to oxygen, and to improve the detergency, a polyvalent metal salt of a seleninic acid. 2,516,616. California Research Corp.

**Preparing an addition agent for mineral oil lubricants** by heating phenyl morpholine with N-dimethylaniline and formaldehyde in the presence of an activated clay catalyst. 2,516,654. Gulf Oil Corp.

**Processing of hydrocarbon synthesis products.** 2,516,699. Standard Oil Development Co.

## *Photographic*

**Gelatino silver chloride emulsion** containing a 3-alkyl isoquinoline or strong mineral acid salts thereof. 2,512,721. Ilford Ltd.

**Polyvinyl acetal color formers.** 2,513,190. E. I. du Pont de Nemours & Co.

**Producing a reversed dyestuff image** in a photographic layer comprising a silver image, an azo coupling component, and a diazotizable amine, by treating said layer with an acidified aqueous nitrite solution to effect diazotization of the diazotizable amine and formation of a diazonium compound only at the points opposite to the silver image. 2,514,233; 2, 514,234. Chromegen, Inc.

**Preventing stains** in photographic color material by treatment with basic acids immediately prior to drying. 2,515,121. General Aniline & Film Corp.

**Preventing stains** in photographic color material by the use of a fixing bath consisting of water, an alkali sulfite, and a fixing agent. 2,515,122. General Aniline & Film Corp.

**Photographic developer** containing an arlkylamine and process of development. 2,515,147. General Aniline & Film Corp.

**Photosensitive glass** consisting of a reduced silicate glass containing copper, cerium oxide, $Sb_2O_3$, and tin oxide. 2,515,275. Corning Glass Works.

**Azo dyestuffs** as photographic coupling components. 2,515,691. Gevaert Photo-Producten N. V.

**Regeneration of photographic silver bleach solution** with a solution containing ferricyanide and a soluble halide by treating the partially spent bleaching solution with a regenerating agent, a substantially water free halogen selected from the group consisting of bromine and chlorine, to convert the ferrocyanide content of the solution into ferricyanide and to increase the soluble halide without giving the regenerated solution a free halogen content. 2,515,930. Pavelle Color, Inc.

**Silver-containing photosensitive glass.** 2,515,936. Corning Glass Works.

**Colorless photosensitive glass** consisting of an oxidized silicate glass containing gold. 2,515,937. Corning Glass Works.

**Photosensitive copper glass.** 2,515,938. Corning Glass Works.

**Opacifiable photosensitive glasses**—irradiated, substantially colorless photosensitive glass consisting essentially of a fluorine-containing, thermally opacifiable, silicate glass containing gold, silver, and copper as $Cu_2O$. 2,515,939. Corning Glass Works.

**Photosensitive opal glass** irradiated substantially colorless photosensitive metal selected from the group consisting of gold, silver, and copper as $Cu_2O$. 2,515,940. Corning Glass Works.

**Photosensitive opal glass** consisting of a silicate glass containing $SiO_2$, an alkali metal oxide selected from the group consisting of $Na_2O$, $K_2O$, and mixtures of $Na_2O$ and $K_2O$, BaO, and gold. 2,515,941. Corning Glass Works.

**Photosensitive glass** consisting of an oxidized silicate glass containing palladium. 2,515,942. Corning Glass Works.

**Clear, transparent photosensitive glass** comprising $SiO_2$; alkali metal oxide selected from the group consisting of $Na_2O$, mixtures of $Na_2O$ and $K_2O$ and mixtures of $Na_2O$ and $Li_2O$; $Al_2O_3$, gold, $CeO_2$, and fluorine. 2,515,943. Corning Glass Works.

## *Polymers*

**Polymer composition**—a linear poly-1,2,4-triazole resistant to hydrolysis by hydrochloric acid and a liquid alcohol. 2,512,599. Celanese Corp. of America.

**Production of a nitrogen-containing polymer,** by heating together sebacic diamide and sebacic dihydrazide and hydrazine. 2,512,600. Celanese Corp. of America.

**Production of a nitrogen-containing polymer** by heating a reaction mixture containing a dicarboxylic reagent and hydrazine. 2,512,601. Celanese Corp. of America.

**Fusible, clear, transparent linear polymide** which is the reaction product of a dicarboxylic acid, in which the carboxyl groups are separated by from 4 to 8 methylene groups, and a stereoisomeric mixture of di(p-aminocyclohexyl) methane. 2,512,606. E. I. du Pont de Nemours & Co.

**Treatment of polymers** containing 4-amino-1.2.4-triazole rings to render the polymer soluble and fusible. 2,512,624. Celanese Corp. of America.

**Compositions** comprising a linear poly-1.2.4-triazole and, as solvent, an oyanitrile. 2,516,625. Celanese Corp. of America.

**Production of nitrogen-containing polymers.** 2,512,626. Celanese Corp. of America.

**Producing copolytriazole-amides.** 2,512,627. Celanese Corp. of America.

**Treatment of linear poly-4-amino-1.2.4-triazole** by reacting with acylating agents and aldehydes. 2,512,628. Celanese Corp. of America.

**Film-forming organic substitution derivative** of cellulose having no affinity for acid wool colors and a poly-4-amino-1.2.4-triazole. 2,512,629. Celanese Corp. of America.

**A monocarboxylic acid ester of cellulose,** saponifiable by alkaline reagents, containing a polymer having in its structural unit an acylated 4-amino-1.2.4-triazole group. 2,512,630. Celanese Corp. of America.

**Improving the properties of a preformed linear polymer** to produce a polymer resistant to hydrolysis by hydrochloric acid. 2,512,631. Celanese Corp. of America.

**Production of a nitrogen-containing polymer** from hydrazine, a dicarboxylic acid, and a diamine. 2,512,632. Celanese Corp. of America.

**Improving the properties of a preformed linear polymer** to produce a polymer resistant to hydrolysis by hydrochloric acid. 2,512,633. Celanese Corp. of America.

**Condensation of linear 1,2,4 triazole** with aldehyde, diisocyanate, or diurethane. 2,512,634. Celanese Corp. of America.

**Production of nitrogen-containing polymers,** by heating a dihydrazide hydrazine to produce a polymer resistant to hydrolysis by hydrochloric acid. 2,512,667. Celanese Corp. of America.

**Hemi-formalization products** of urea-formaldehyde resinous condensates. 2,512,671. Borden Co.

**Soluble and fusible formalization products** of urea-formaldehyde resinous condensates. 2,512,672. Borden Co.

**Polymerization of aromatic polyfulvenes.** 2,512,698. Universal Oil Products Co.

**Chloral-dihydric phenol polymers.** 2,512,709. E. I. du Pont de Nemours & Co.

**Dry-sulfanilic acid-modified urea-formaldehyde resin** prepared from sulfanilic acid and formaldehyde and urea. 2.512,720. Hercules Powder Co.

**Polyesters of 2-ethylhexanediol-1,3.** 2,512,722. Union Carbide and Carbon Corp.

**Plastic composition**—a copolymer of vinyl chloride and vinyl acetate plasticized with liquid polyesters of 2-ethylhexanediol-1,3 with aliphatic saturated dicarboxylic acids having from 4 to 10 carbon atoms. 2,512,723. Union Carbide and Carbon Corp.

**Copolymer of vinyl chloride, vinyl acetate and vinyl alcohol,** a film-forming ingredient compatible with said copolymer, and an organic solvent. 2,512,726. Union Carbide and Carbon Corp.

**Composition** capable of conversion to water-insoluble, infusible products—an aliphatic polyepoxide with a plurality of epoxide groups and free from functional groups other than alcoholic hydroxyl and epoxide groups and a resinous ether epoxide prepared by reaction of epichlorhydrin and of alkali with a polyhydric phenol. 2,512,996. Devoe & Raynolds Co., Inc.

**Producing vinyl substituted aromatic compounds** and their polymers by reacting a methyl benzene with acetylene in the presence of hydrogen fluoride promoted with a fluoride salt of mercury in the liquid phase. 2,513,180. Dominion Tar & Chemical Co., Ltd.

**Copolymer products** of a synthetic rubber, made from butadiene and styrene, and a minor portion of a tackifier copolymer derived from a monomeric mixture of isobutylene, butadiene, and styrene. 2,513,183. Sun Oil Co.

**Mixed Phenylene sulphide resins.** 2,513,188. Alexander D. Macallum.

**Preparation of polyvinyl acetals.** 2,513,189. E. I. du Pont de Nemours & Co.

**Preparing a resinous homopolymer** by adding a catalyst solution consisting of an aluminum halide dissolved in an alkyl chloride to a cyclic dimer of a diolefin of the group consisting of butadiene, piperylene and isoprene. 2,513,244. Standard Oil Development Co.

**Preparing resin-containing polymerization products** by heating butadiene-1,3 or piperylene in the absence of oxygen. 2,513,244. Standard Oil Development Co.

**A continuous body of diallyl phthalate resin** having a multiplicity of glass fibers distributed therethrough, and therein a small amount of methallyl silicate. 2,513,268. Owens-Corning Fiberglas Corp.

**Rapid-curing resin combination**—a mixture of a liquid phenol-formaldehyde resin and a phenol-resorcinol-formaldehyde resin. 2,513,274. Monsanto Chemical Co.

**Copolymer** of vinyl fluoride and chlorotrifluoroethylene. 2,513,312. E. I. du Pont de Nemours & Co.

**Chlorinating a solid polymer of styrene** by dissolving in liquid chlorine and reacting with a portion of the liquid chlorine. 2,513,330. Federal Telephone and Radio Corp.

**Solid oxidized polymer** of alkyl pentadiene. 2,513,389. Standard Oil Development Co.

**Methanolysis of polyvinyl esters** in methanol containing an acid catalyst of mineral acids or sulfonic acids. 2,513,488. E. I. du Pont de Nemours & Co.

**Production of vinyl polymer plastic compositions** of low temperature flexibility and improved electrical properties—a vinyl polymer with chlorinated hydrocarbons which have been produced by extracting from mineral oil fractions. 2,513,632. Anglo-Iranian Oil Co., Ltd.

**Production of uniform high molecular weight rubberlike form-stable vinyl ether polymers** by polymerizing a vinyl ether with an acid-reacting catalyst in a solvent diluent comprising a normally gaseous aliphatic hydrocarbon having a selective solvent action for the lower weight polymers formed in the reaction, and isolating the higher molecular weight form-stable polymer. 2,513,820. General Aniline & Film Corp.

**Polyester resin adhesive compositions.** 2,514,141. American Cyanamid Co.

**Homogeneously compounded composition**—polyvinyl chloride and tetraethylene pentamine. 2,514,185. Firestone Tire & Rubber Co.

**Antisticking treatment of vinyl resins** by washing with water, and with an aqueous dispersion of a surface-active agent containing a fatty group of at least 7 carbon atoms. 2,514,191. Firestone Tire & Rubber Co.

**Articles composed** of crystalline and oriented polymers and copolymers of 2,3-dichlorobutadiene-1,3. 2,514,195. Firestone Tire & Rubber Co.

**Resorcinol formaldehyde adhesive.** 2,514,196. Firestone Tire & Rubber Co.

**Stabilization of dichlorobutadiene resins** with a 4-alkylphenyl salicylate. 2,514,216. Firestone Tire & Rubber Co.

**Composition** adapted to yield a transparent colorless color-stable polymer—a monomeric α-halogen substituted acrylic acid compound containing an ester of a monohydroxy monocarboxylic acid of 2 to 3 carbon atoms. 2,514,305. General Aniline & Film Corp.

**Composition of matter** comprising gelatin and a water-soluble reaction product of polyvinylisocyanate and a compound having the following formula: ROH, where R stands for a hydrogen or alkyl radical. 2,514,328. General Aniline & Film Corp.

We'll go along with Turkey for THANKSGIVING
It's the National bird on this day of feasts. Some folks will go for duck, chicken, or a good roast of beef, but 9 of every 10 will say: "Make mine turkey on Thanksgiving Day."
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**Thermosetting resin**—the condensation product of 2-oxo-4,5-diimino parabanic acid and an aldehyde. 2,514,353. Monsanto Chemical Co.

**Copolymer** of diallyl carbonate and an ester from the group consisting of diallyl adipate and a diallyl ester of a mononuclear aromatic dicarboxylic acid. 2,514,354. Shell Development Co.

**Arylalkylolamines** as stabilizers for emulsion polymer latices. 2,514,362. Standard Oil Development Co.

**Alkyl phenol-hydroxylamine** mixtures as polymerization short-stops. 2,514,363. Standard Oil Development Co.

**Polymerizable styrene-tall oil modified** polyester composition. 2,514,389. Monsanto Chemical Co.

**Vinyl halide resin compositions** containing hydroxystearic acid esters as plasticizers and alkaline earth metal ricinoleates as stabilizers. 2,514,424. Baker Castor Oil Co.

**Resinous condensation products** of urea, alkyl urea, formaldehyde, and polyhydric alcohol. 2,514,505. Sharples Chemicals Inc.

**Surface active agent**—a water soluble salt of an adduct of an acidic dienophile and a polyolefinic, cyclic hydrocarbon fraction. 2,514,533. Universal Oil Products Co.

**Copolymers of acrylonitrile and isopropenyl acetate.** 2,514,624. Eastman Kodak Co.

**Alkyl allyloxvalkyl maleate** copolymer with a polymerizable monovinylidene compound miscible with said ester. 2,514,895. Rohm & Haas Co.

**Wax composition** containing propylene-butadiene polymer. 2,514,979. Atlantic Refining Co.

**Purifying a polymeric drying oil** by dissolving the oily polymer in a hydrocarbon solvent and filtering the resulting solution. 2,514,986. Standard Oil Development Co.

**Water insoluble, granular, anion-active synthetic resinous material** obtained by reaction between furfural and a monomeric heat condensation product of a member of the group consisting of guanidine, mono- and di-monovalent hydrocarbon and furfuryl-substituted guanidines, biguanide, mono- and di-monovalent hydrocarbon and furfuryl-substituted biguanides and their salts with a carbonyl compound selected from the group consisting of aldehydes having from 2-10 carbon atoms and ketones having from 3-13 carbon atoms. 2,515,116. American Cyanamid Co.

**Interpolymers** of diallyl esters of diethyl ether-dicarboxylic acids. 2,515,132. Wingfoot Corp.

**An anion-active, granular, water-insoluble, resinous reaction product of epichlorohydrin** and an alkylene polyamine and a cation active granular, water-insoluble material which is a sulfonated coal. 2,515,142. AmericanCyanamid Co.

**Producing resinous products,** by reacting in the presence of an acid-reacting condensation agent a vinyl ether. 2,515,164. General Aniline & Film Corp.

**Polymerizing rosin** by treating in liquid phase in the presence of hydrochloric acid or hydrobromic acid and fuller's earth, bentonite, rottenstone, montmorillonite, New Jersey clay, and bauxite. 2,515,218. Glidden Co.

**Producing a condensation product** of 4-picoline and sulphur. 2,515,233. Koppers Co., Inc.

**Polymerization of 2-substituted thiazoles.** 2,515,318. United States Rubber Co.

**Producing condensation products,** suitable as softening or plasticizing material for rubber, by the condensing of aromatic hydrocarbons and hydroxy-substituted aromatic hydrocarbons with 1,3-dichlorobutene-2 in the presence of the halogenides of aluminum, iron and zinc. 2,515,335. Bata, Narodni Podnik.

**Activating anion and cation exchange resins** in the presence of each other by treating with acid and then with (1) hexamethylenetetramine and (2) ammonia followed by formaldehyde. 2,515,581. American Cyanamid Co.

**Production of solid polymeric resinous products** by subjecting a non-polymerizable hydrocarbon oil—(indene, coumarone, styrene and their homologs)—to the polymerizing action of stannic chloride. 2,515,646. Allied Chemical & Dye Corp.

**Composition** adapted to be mass polymerized to a transparent, colorless, color-stable polymer. 2,515,686. General Aniline & Film Corp.

**Preparing colorless polymers** of vinyl sulfonic acid, α-alkyl vinyl sulfonic acids, α-halo vinyl sulfonic acids and the esters, amides and acid halides of these vinyl sulfonic acids. 2,515,714. General Aniline & Film Corp.

**Alkyd resins** derived from cyclohexene oxide. 2,515,758. Pharma Chemical Corp.

**Phonograph record** containing polyvinyl acetal resins, ethyl cellulose, and soft, low melting point resins. 2,515,800. Radio Corp. of America.

**Molding composition** for making phonograph records—ethyl cellulose, polyvinyl acetate, a thermoplastic resinous material, a plasticizer for ethyl cellulose and polyvinyl acetate, and a filler. 2,515,801. Radio Corp. of America.

**Glyoxal-tertiary-butyl cresol** condensation products. 2,515,909. Gulf Research & Development Co.

**Fast-curing resinous composition**—(a) an unsaturated alkyd resin derived by reacting maleic acid, aconitic acid, citraconic acid and fumaric acid, their anhydrides and their acyl chlorides, and a polyhydric alcohol, (b) the partially reacted resinous product of a polyhydroxy benzene, (c) a diester of a monohydric hydrocarbon alcohol and an acid half ester of saturated paraffinic polyhydric alcohol and a dibasic acid selected from the group consisting of maleic acid, fumaric acid and citraconic acid, and (d) a metallic drier. 2,516,012. Westinghouse Electric Corp.

**A heat-curable polyorganosiloxane,** a substance selected from the group consisting of lead compound curing catalysts and cobalt compound curing catalysts, and a catechol as a stabilizer. 2,516,047. Bell Telephone Labs., Inc.

**Polymerization** of the dimethacrylate esters of a mixture of glycols and, as a polymerization catalyst, cobalt nitrate. 2,516,064. E. I. du Pont de Nemours & Co.

**Impressionable mass** for taking intra and extra oral impressions of ethyl methacrylate polymer and isobutyl methacrylate polymer, with alcohol and naphtha. 2,516,155. H. D. Justi & Son, Inc.

**A halogenated hydrocarbon** and a copolyamide obtained by the condensation poymerization of a mixture of at least two N-carboanhydrides of alpha amino acids. 2,516,162. E. I. du Pont de Nemours & Co.

**Aryl and alkyl alkenyl-phosphonate** plasticizing esters. 2,516,168. Victor Chemical Works.

**Preparation of a resinous normally solid material** from the polymeric by-product of a process for clay treating an unrefined cracked distillate, by reacting the polymeric by-product with sulfur in the presence of a catalyst comprising one of the group consisting of mercaptobenzothiazole and methylmercaptobenzothiazole. 2,516,230. Phillips Petroleum Co.

**Vinyl resins plasticized with cyano esters.** 2,516,307. General Mills, Inc.

**Unsaturated alkyd casting resins.** 2,516,309. Monsanto Chemical Co.

**Furfuraldehyde-acetonyl acetone reaction product.** 2,516,317. Harvel Research Corp.

**Making polyamides** by heating terephthalic acid and bis(4-amino-3-methylcyclohexyl)-methane. 2,516,585. E. I. du Pont de Nemours & Co.

**A chlorinated solid polythene** containing 35% chlorine; and precipitated hydrated calcium silicate. 2,516,591. E. I. du Pont de Nemours & Co.

**Polymerization process** comprising dissolving aluminum chloride in an alkyl chloride, cooling, adding a diolefin having 4 to 6 carbon atoms and forming a stable, non-polymerizing solution; cooling a substantial quantity of polymerizable isobutylene feed and adding to it the cold catalyst diolefin mixture. 2,516,683. Standard Oil Development Co.

**Tough, flexible plastic composition**—a polyamide resin formed by condensation of ethylene diamine and methyl dilinoleate, compounded with thermoplastic styrene-isobutylene copolymer. 2,516,741. Standard Oil Development Co.

## *Rubber*

**Making synthetic rubber carbon black compositions** without mastication. 2,512,697. Theodore A. Te Grotenhuis.

**Vulcanizing rubber** by heating in the presence of a sulfenamide. 2,514,181. Firestone Tire & Rubber Co.

**Quick-curing cement**—polychloroprene, solvent, and as accelerator, carbon disulfide and dibenzylamine. 2,514,192. Firestone Tire & Rubber Co.

**Stabilization of synthetic and natural rubber** with antimony salts of phenol sulfides. 2,514,193. Firestone Tire & Rubber Co.

**Soft vulcanized rubbery composition** flexible at low temperatures containing polybutadiene and polychloroprene. 2,514,194. Firestone Tire & Rubber Co.

**Rubber-like composition** stabilized by a stannous salt of catechol and alkyl catechol in which the total of the carbons in the alkyl groups is one to ten. 2,514,198. Firestone Tire & Rubber Co.

**Vulcanization of rubbers** by means of 2,5-di-substituted tetrahydro-1,2,5-thiadiazines. 2,514,200. Firestone Tire & Rubber Co.

**Vapor phase polymerization of butadiene** with sodium. 2,514,203. Firestone Tire & Rubber Co.

**Simultaneous recovery of styrene, etc.,** and concentration of latex. 2,514,207. Firestone Tire & Rubber Co.

**Vulcanizing rubber** by heating rubber and sulfur in the presence of a sulfenamide. 2,514,208. Firestone Tire & Rubber Co.

**Vulcanized rubber** containing as a flex-cracking inhibitor a viscous, syrupy, alkali-catalyzed, low-molecular-weight condensation product of formaldehyde and an alkyl phenol. 2,514,209. Firestone Tire & Rubber Co.

**Stabilizing rubber-like copolymer** of a conjugated-diene monomer and a vinyl aromatic monomer with stannous diphenol sulfoxide, stannous di(halogen-substituted phenol) sulfoxides, or stannous di(hydrocarbon-substituted phenol) sulfoxides. 2,514,210. Firestone Tire & Rubber Co.

**Natural rubber vulcanizate** which contains as an antiflex-cracking agent a small amount of a stannous catecholate. 2,514,217. Firestone Tire & Rubber Co.

**Natural rubber vulcanizate** which contains as an antiflex-cracking agent, an alkylated naphthol. 2,514,218. Firestone Tire & Rubber Co.

**Rubber-like copolymer** stabilized by a substituted naphthol. 2,514,220. Firestone Tire & Rubber Co.

**Rubbery copolymer** of a conjugated-diene monomer and a vinyl monomer stabilized with a stannous p-phenylcatecholate. 2,514,221. Firestone Tire & Rubber Co.

**Crack-resistant vulcanized rubber.** 2,514,661. Shell Development Co.

**In production of rubber-like materials,** dispersing sulfur in an aqueous sodium monosulfide solution, heating, and reacting with ethylene dichloride. 2,514,734. Hans Paul Wagner.

**Production of light colored, non-toxic rubber-like materials** by heating an aqueous emulsion a polymerizable monomeric charge consisting of at least one branch-chain 1,3-hexadiene having a methyl group directly attached to a penultimate carbon atom of a straight chain of 5 carbon atoms in the presence of tertiary butyl hydroperoxide. 2,514,928. Shell Development Co.

**Accelerating the vulcanization of natural rubber** by curing in the presence of sulfur and an amino-methyl ester of dithiofuroic acid. 2,515,119. Wingfoot Corp.

**Reducing the viscosity of crude natural rubber** by contacting solid unvulcanized natural rubber with ketene vapor and oxygen. 2,515,307. United States Rubber Co.

## *Specialties*

**Preserving raw plant tissue** by treating the exposed surfaces with a peracid of the fatty acid series. 2,512,640. Buffalo Electro-Chemical Co., Inc.

**Liquid dielectric composition**—an ester of tetrahydro furfuryl alcohol, dibutyl sebacate and esters of tetrahydro furfuryl alcohol. 2,512,886. General Electric Co.

**Product for inhibiting corrosion of metal objects** comprising a volatile compound comprising a lower alkylol amine. 2,512,949. Nox-Rust Chemical Corp.

**Printing ink** substantially non-corrosive to printing presses that sets upon the addition of water—a solution in a liquid glycol solvent of a binder consisting of a product of the co-heating of a rosin with beta naphthol pitch. 2,513,122. J. M. Huber Corp.

**Dry composition for silver-cleaning** comprising aluminum metal and an electrolyte consisting of a mixture of calcium hydroxide, sodium bicarbonate, and potassium chlorate. 2,513,187. Ultra Chemical Works, Inc.

**Electric battery** comprising a zinc negative electrode, a silver peroxide positive electrode, an electrolyte of sodium hydroxide and an alkali metal ethylate. 2,513,292. Irving A. Denison and Paul L. Howard.

**Preparation** of colorless thin boiling starch by use of a mineral acid and hexavalent chromium. 2,514,055. A. E. Staley Mfg. Co.

**Composition** for producing fire extinguishing foams—an aqueous solution of anionic and non-ionic, non-saponaceous surface tension reducing agents and a carboxy methyl cellulose. 2,514,310. General Aniline & Film Corp.

**Resolution of oil-in-water emulsions** by action of a water dispersible product of the reaction of a polyalkylene glycol and a detergent forming acids and their esters having at least 8 carbon atoms. 2,514,399. Visco Products Co.

**For a storage battery of the lead-acid type,** a plate having a paste of an active lead compound and an amino anion exchange body. 2,514,415. Carl H. Rasch.

**Adhesive composition**—a mixture of 70% chlorinated paraffin, methacrylate resin, and a solvent. 2,514,427. Armstrong Cork Co.

**Adhesives** from blood hemoglobin, formaldehyde, a peroxide, and ethylene diamine. 2,514,789. Armour and Co.

**Corrosion inhibiting composition**—a water-soluble polyphosphate and a water-soluble inorganic complex cyanide. 2,515,529. National Aluminate Corp.

**Planographic repellent composition**—a solution of water, glycerine, monoammonium dihydrogen phosphate and a water-soluble aldehyde. 2,515,536. Addressograph-Multigraph Corp.

**Use of monofluoro alkyl silane** as heat transfer agent. 2,515,672. Frank J. Sowa.

**Producing an antioxidant concentrate,** by reacting a crude vegetable oil with ammonia, then with a solvent miscible with fatty materials, and separating a solvent solution containing a highly active antioxidant extract. 2,515,858. Nopco Chemical Co.

**Producing an antioxidant concentrate,** by reacting a crude vegetable oil with ammonia, contacting the ammonia-treated oil with methanol or ethanol, and separating. 2,515,859. Nopco Chemical Co.

**Producing an antioxidant concentrate,** by reacting a crude vegetable oil with ammonia, contacting with isopropyl alcohol, n-propyl alcohol, acetone, diacetone alcohol, ethyl acetate, methyl acetate, methyl ethyl ketone. 2,515,860. Nopco Chemical Co.

**Antioxidants for oils** comprising bis(hydroxyphenyl) alkanes. 2,515,908. Gulf Research & Development Co.

**Improvement of activated carbon** by increasing adsorptive selectivity and capacity. 2,516,233. Union Oil Co. of Calif.

**Dry, reducing composition**—a mixture of sodium tetraborate, paraformaldehyde, and sodium dithionite. 2,516,321. Rohm & Haas Co.

**Dental pulp capping preparation** of calcium hydroxide and eugenol and linseed oil. 2,516,438. Norton L. Wheeler.

**Homogeneous hydraulic fluid comprising** (1) a neutral ester of a monohydric alcohol and the mixture of acids obtained by the oxidation with gaseous oxygen of an aqueous alkaline slurry of a finely divided carbonaceous material selected from the group consisting of coal and coke obtained by the carbonization of coal and (2) a relatively non-volatile diluent boiling in the kerosene range. 2,516,640. Gulf Research & Development Co.

## *Textiles*

**Producing casein yarn** by extruding threads of an alkaline solution of casein into an organic acid precipitating bath. 2,512,674. U.S.A. as represented by Secretary of Agriculture.

**Production of artificial filaments, bristles and films,** by spinning a linear polymer containing in its structural unit the 4-amino-1.2.4-triazole ring in acetic acid into an aqueous coagulating bath containing caustic soda and formaldehyde. 2,512,891. Celanese Corp. of America.

**Mercerization** of single ply cotton yarns with a caustic soda solution. 2,512,951. Dixie Mercerizing Co.

**Textile-finishing composition**—a homogeneous association of an alkylated methylol melamine and melamine fluosilicates and melamine fluoborates. 2,514,132. American Cyanamid Co.

**Bath for shrinkproofing wool**—aqueous emulsion containing a synthetic copolymer of butadiene-1,3 and a vinyl ester selected from the group consisting of halides and fatty acids. 2,514,517. ½ to Montclair Research Corp. and ½ to Ellis-Foster Co.

**Treatment of filaments having a basis of polymeric material** selected from the group consisting of polyurethanes and polycarbamides, by heating in a solution of a substance, selected from the group consisting of formaldehyde-yielding substances. 2,514,550. Celanese Corp. of America.

**Fabric formed of wool fibers,** resistant to decomposition when subjected to temperatures up to about 300° F.; said fabric having a complex, metallothiocyanate chemically combined with fibers. 2,515,181. Albany Felt Co.

**Spinning** by forming a solution of an acrylonitrile tripolymer in a nitroalkane of no more than 2 carbon atoms, and extruding in a bath comprising an aromatic hydrocarbon liquid, said tripolymer containing acrylonitrile, vinylidene chloride and vinyl chloride. 2,515,206. Industrial Rayon Corp.

**Continuous process of bleaching cotton materials** with a hypochlorite solution. 2,515,532. Diamond Alkali Co.

**Anti-felting of wool** by partial halogenation and thereafter subjecting to a resin treatment. 2,516,055. Botany Worsted Mills.

**Sizing textiles** with a hot aqueous bath for yarns of lower fatty acid ester of cellulose filaments with a composition of an aqueous solution containing a water-soluble lower fatty acid ester of cellulose and urea. 2,516,267. Celanese Corp. of America.

**Obtaining improved nylon filaments having a wool-like crimp,** by dry heating in relaxed condition an oriented nylon filament in presence of formaldehyde. 2,516,562. E. I. du Pont de Nemours & Co.

### *Agricultural**

**Granulating DDT** by dispersing fused DDT in water with the aid of an emulsifying agent cooling, with agitating. 2,518,191. E. I. du Pont de Nemours & Co.

**Aqueous water-dispersible chemical**—blend of water, finely-divided DDT, surface-active agent, polyvinyl alcohol. 2,519,088. E. I. du Pont de Nemours & Co.

**Halogenated hydrocarbon**—derivative of 4,5,6,7,8,8-hexahalo-3a,4,7,7a-tetrahydro-4,7-methanoindene for use as an insecticide. 2,519,190. Velsicol Corp.

**Fungicide**—a fluorochloronitroaromatic compound. 2,519,317. Ethyl Corp.

**Thenyl ester miticide composition.** 2,519,383. Monsanto Chemical Co.

**Herbicidal formulations**—water-soluble salt of 2,4-dichlorophenoxyacetic acid and the condensation product of abietic acid, tall oil, rosin and ethylene oxide. 2,519,780. Monsanto Chemical Co.

### *Cellulose**

**Hydrolyzing the carbohydrate content of wood** to obtain a readily fermentable pentose-rich sugar liquor. 2,516,833. Olli Viljo Anton Ant-Wuorinen.

**Making an intimate admixture** of resinous material and ligno-cellulose fiber. 2,516,847. Masonite Corp.

**Producing a cellulose ester of lower aliphatic acids** by mixing cellulose with the anyhdride of a lower aliphatic acid and a catalyst selected from the group consisting of cellulose esterification catalysts other than sulfuric acid. 2,517,096. Societe Rhodiaceta.

**Preparation of carboxyalkyl ethers of cellulose** by reacting cellulose with a carboxyalkyl halide etherification agent to form a cellulose carboxyalkyl ether. 2,517,577. Hercules Powder Co.

**Surgical dressing**—cellulose fibers partially oxidized by $NO_2$. and impregnated with thrombin. 2,517,772. Parke, Davis & Co.

**Production of water-soluble salts of carboxyalkylcellulose ethers** of reduced viscosity. 2,517,835. E. I. du Pont de Nemours & Co.

**Preparing halogen substituted aliphatic acid esters of cellulose.** 2,518,203. E. I. du Pont de Nemours & Co.

**Colorless, fire- and waterproofing composition** consisting of chlorinated paraffins, an unmodified phenol-formaldehyde resin, calcium carbonate, antimony oxide, and aluminum stearate, admixed in the presence of an aromatic hydrocarbon solvent. 2,518,241. Treesdale Labs., Inc.

**Preparing a cellulose ester** capable of being dyed with wool-type dyes by heating a mixture of a lower fatty acid ester of cellulose and ethylene imine whereby a $\beta$-amino ethoxyl cellulose ester is obtained. 2,518,676. Eastman Kodak Co.

**Cellulose ester of a sulfamic acid** containing less than 1 disubstituted sulfamyl group per glucose unit the substituents on the sulfamyl being selected from the group consisting of the lower alkyl and aryl groups. 2,518,706. Eastman Kodak Co.

**Forming artificial filaments** by extruding viscose into an aqueous acid coagulating liquid in the presence of a dissolved, substantially stable, surface-active non-ionogenic acetal of a polyethylene glycol. 2,519,227. American Viscose Corp.

**Rendering fibers, yarns and fabrics** of regenerated cellulose water-repellent and resistant to coloration by dyestuffs by treating with a solution of an organo-silicon halide. 2,519,232. American Viscose Corp.

**Producing alkali salts of carboxylic ethyl cellulose ethers** by carrying out the reaction between acrylonitrile and cellulose in the alkaline solution. 2,519,249. Phillips Petroleum Co.

### *Ceramics**

**Mix** for making refractory concrete by the addition of water comprising calcium-aluminate cement. 2,516,892. Universal Atlas Cement Co.

**Mix** for making refractory concrete by the addition of water, consisting of Portland cement, Portland-blast-furnace-slag cement, pozzuolan cement, true pozzuolanic cement, slag cement and natural cement; aggregate selected from the group consisting of fire-clay grog, crushed brick, expanded shale, diatomaceous earth and vermiculite; and a frit effective to form a vitreous bond when heated, said frit being composed of silicon dioxide, oxides of metals selected from the group consisting of aluminum and boron, and oxides of metals selected from the group consisting of potassium and sodium. 2,516,893. Universal Atlas Cement Co.

**Synthetic micaceous product**—a solid solution of fluorphlogopite and taeniolite as expressed by the formula $K_2Mg_{4+2x}Li_{2-2x}Al_{2x}Si_{8-2x}O_{20}F_4$ where x is the mol fraction of fluor-phlogopite. 2,516,983. Corning Glass Works.

**Colorless optical glass** consisting of $SiO_2$, $B_2O_3$, BeO, CaO, $ZrO_2$, BaO, and CdO. 2,517,459. Corning Glass Works.

**Bonding refractory** for use in molds and cores—siliceous silicon dioxide or silicon carbide, the particles coated with a hydrocarbon resin. 2,517,815. Bonheur Massena Weston.

**Phosphate base glass**—at least one oxide of the group consisting of $MoO_3$ and $WO_3$, at least one of the group consisting of $Bi_2O_3$ and PbO, $P_2O_5$, and "minor oxides." 2,518,194. Alexander Silverman, Joseph J. Rothermel and Kuan-Han Sun.

### *Coatings**

**Mildew resistant paint composition**—soybean oil, calcium oxide, a pigment consisting of red iron oxide, and a drier. 2,517,580. U.S.A. as represented by the Secretary of Agriculture.

**Wax-free hot-melt coating**—an ethyl cellulose, refined mineral oil and an ethylene diamine polyamide of a partially polymerized acid selected from the group consisting of linoleic and linolenic acids. 2,517,754. Dow Chemical Co.

**Liquid mixture for producing a resin like protective coating**—a metal naphthenate soap, a metal tall oil soap, and a carrying vehicle which acts as a solvent. 2,518,438. Nox-Rust Corp.

**Non-aqueous coating composition**—organic film-forming material selected from the group consisting of vegetable drying oil modified alkyd resins, monohydric alcohol modified urea-formaldehyde resins, and nitrocellulose; and a polymer of ethylene. 2,518,462. E. I. du Pont de Nemours & Co.

**Resinous reaction product** adapted for making coating compositions—an esterified mixture of a polyhydric alcohol with an unsaturated natural resin acid, a monocarboxylic acid selected from the group consisting of unsaturated fatty acids obtained by hydrolysis of drying and semi-drying oils, and a dicarboxylic acid monoester of a beta-unsaturated monohydric alcohol of from 3 to 4 carbon atoms. 2,518,497. ¼ to Montclair Research Corp. and ¾ to Ellis-Foster Co.

**Composition for bluing metal** of the following ingredients in water: copper sulfate; sulfuric and hydrochloric acid; lauryl sulfate; trataric acid; stannous chloride; and glacial acetic acid. 2,519,672. Charles F. Lawless.

### *Detergents**

**Detergent sanitizer composition** in the form of a free-flowing powder—sodium carbonate, tetra sodium pyrophosphate, nona-ethylene glycol mono ester of soya bean fatty acids, and oleyl dimethyl ethyl ammonium bromide. 2,519,747. Onyx Oil & Chemical Co.

**Detergent briquette** consisting of water, one detergent of the group consisting of sodium carbonate and trisodium phosphate, and at least one polyphosphate of the group consisting of tetrasodium pyrophosphate, sodium tripolyphosphate, sodium tetraphosphate and sodium hexametaphosphate, and a quaternary ammonium compound. 2,519,841. Mathieson Chemical Corp.

### *Dyes and Pigments**

**Polyazo dyestuffs** of the pyrazolone series. 2,517,312. J. R. Geigy A. G.

**Preparing a pigment** of the cadmium sulfide and cadmium sulfoselenide group by reacting an aqueous cadmium salt solution containing ammonium sulfate with a water-soluble sulfide solution to precipitate a crude cadmium sulfide pigment, washing and calcining under conditions which minimize the oxidation of the pigment to cadmium oxide. 2,517,594. Glidden Co.

**Acid dyestuffs of the anthraquinone series.** 2,517,613. Sandoz Ltd.

**Dyeing cellulose acetate with an acid dye** by treating with a dyebath of water, an acid dye, a lower aliphatic alcohol as primary dyeing assistant, and an auxiliary dyeing assistant selected from the group consisting of resorcinol,

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phloroglucinol, and cyclohexanol. 2,517,751. American Viscose Corp.

**Water-insoluble copper complex of the monazo coupling product** produced by coupling in a medium alkaline with ammonia the diazo of 5-nitro-2-amino-phenol with the ethyl ester of acetoacetic acid; and concurrently metallizing with copper. 2,517,890. E. I. du Pont de Nemours & Co.

**Increasing the light fastness of an azoic pigment** from tetrazotized dianisidine and the orthophenetidide of 2,3-hydroxy naphthoic acid by heating the pigment in an aqueous medium until the pigment has been transformed into a physical form having enhanced light fastness and characterized by an X-ray diffraction pattern. 2,517,924. American Cyanamid Co.

**New stilbene dyestuff** obtained by condensation of 4:4′-dinitrostilbene-2:2′-sulfonic acid, a monoazo dyestuff and another monoazo dyestuff. 2,518,020. Sandoz Ltd.

**Azo dyestuffs.** 2,518,023. J. R. Geigy A. G.

**Azo-dyestuffs.** 2,518,077. Ciba Ltd.

**Monoazodyestuffs of the pyrazolone series** free from sulfonic acid groups. 2,518,078. J. R. Geigy A. G.

**Vat dyestuff** of the general formula $R_1$-NH-$R_2$ wherein $R_1$ stands for a 1:9-pyrazolanthrone radical and $R_2$ stands for a 1-benzoylaminoanthraquinone radical. 2,518-150. Ciba Ltd.

**Dyeing of cellulose esters** with reduced vat dyes in alcoholic solution. 2,518,153. E. I. du Pont de Nemours & Co.

**Water-dispersible pastes** of gas fume fading inhibitors for acetate silk dyes. 2,518,393. E. I. du Pont de Nemours.

**Merocyanine dyestuffs.** 2,518,475. Ilford Ltd.

**Cyanine dyestuffs.** 2,518,476. Ilford Ltd.

**Merocyanine dyestuffs.** 2,518,477. Ilford Ltd.

**Coloration of organic derivative of cellulose textile materials** by impregnating the textile with a dyebath consisting of water, a dyestuff, a lower aliphatic acid, a salt of thiocyanic acid which is a swelling agent for the textile. 2,518,644. Celanese Corp. of America.

**Azomethine dyes.** 2,518,705. E. I. du Pont de Nemours & Co.

**Preparing trinuclear cyanine dyes** containing a terminal 5-membered nitrogenous heterocyclic ring system. 2,518,-730 General Aniline & Film Corp.

**Symmetrical and unsymmetrical tetranuclear cyanine dyes.** 2,518,731. General Aniline & Film Corp.

**Methine dyes** containing an isoquinoline nucleus. 2,518,737. Eastman Kodak Co.

**Merocyanine dyes** containing a carboxylalkyl group or a sulfoalkyl group. 2,519,001. Eastman Kodak Co.

**Physically stable castor-oil-soluble form of Victoria Pure Blue BO** whose molecules are associated with an aliphatic polyhydroxy compound of the group of glycol glycerine, pentaerythritol, diethylene glycol, sorbitol and 2-methyl-2,4-pentanediol, characterized by stability against crystal growth in hot castor oil. 2,519,210. E. I. du Pont de Nemours & Co.

**Sesquicyanine dyes.** 2,519,797. Imperial Chemical Industries Ltd.

**Dyeing basic nitrogenous fibers** by the metachrome process with chromable azo dyes having nitrogen free substituents ortho to the azo group. 2,520,080. American Cyanamid Co.

**Metachrome dyeing.** 2,520,081. American Cyanamid Co.

**Metachrome dyeing procedure.** 2,520,105. American Cyanamid Co.

**Method of producing dyeings** metallized with aluminum, manganese, iron, cobalt, nickel, copper, tin, and zirconium. 2,520,106. American Cyanamid Co.

**Dyeing protein fibers** with chromable anthraquinone colors by the metachrome process. 2,520,108. American Cyanamid Co.

## *Explosives**

**Gelatine blasting explosive** containing an NN′ bis (alkoxymethyl) diamide of a dicarboxylic acid, and an NN′ dimethylol diamide of a dicarboxylic acid. 2,518,066. Imperial Chemical Industries Ltd.

## *Inorganic**

**Regenerating an aqueous alkali solution** containing weakly acidic sulfur compounds and an oxidation promoter consisting of gallic acid, tannic acid and tannins. 2,516,837. Socony-Vacuum Oil Co., Inc.

**Producing purified sodium chloride brine** by passing an aqueous feed solution down through a bed of salt. 2,516,-987. International Salt Co.

**Producing purified sodium chloride brine,** by adding caustic soda to the feed solution and incorporating barium carbonate in the dry form with the salt in the salt bed. 2,516,988. International Salt Co.

**Producing hydrogen** by passing carbon monoxide and steam into contact with a catalyst. 2,517,177. American Magnesium Metals Corp.

**Regenerating deactivated aluminum halide-hydrocarbon sludge** by reacting with an olefin and metallic aluminum and with anhydrous hydrogen halide to precipitate a catalytically active material comprising free aluminum halide. 2,517,692. Universal Oil Products Co.

**In production of sodium hydroxide from sodium sulfate,** the steps of carbonating an aqueous solution of the sodium sulfate, saturating with ammonia, carbonating the ammoniacal solution to produce sodium bicarbonate, separating the sodium bicarbonate and converting to sodium hydroxide. 2,518,530. American Viscose Corp.

**Catalyst** consisting of an active helium gel carrier containing an oxide of silicon, titanium or zirconium precipitated thereon, beryllia, and a catalytic agent selected from the class consisting of the oxides of the metals of group VI B. 2,518,714. Union Oil Co. of Calif.

**Production of a purified magnesium compound** by the carbonation of an aqueous slurry of calcined magnesite containing lime as an impurity, and separation of a magnesium bicarbonate solution, and adding an excess of lime to the slurry undergoing carbonation, to precipitate calcium. 2,519,361. U.S.A. as represented by the Secretary of the Interior.

**Activating deteriorated sodalitic-seeding material** for use in desiliciz sodium aluminate solutions by boiling in a strong solution of the sodium salt component of the sodalitic material. 2,519,362. Einar P. Flint, Leo Shartsis and Lansing S. Wells.

**Preparing titanium tetraiodide** by heating titanium carbide with iodine in vapor form in the presence of titanium tetrachloride to produce a titanium tetraiodide and titanium tetrachloride and fractionating. 2,519,385. Chilean Nitrate Sales Corp.

**In producing a rultile inducing seed** for hydrolysis of hydrolyzable titanium salt dispersions, heating to boiling a solution of a chloride of titanium containing a stabilizer having polyvalent anions and which on calcination volatilizes said stabilizer being present in the solution during the heating, said heating being carried out until curing is effected, and then rapidly cooling. 2,519,389. Max J. Mayer.

**Concentrating a weak aqueous solution of ammonia** to produce anhydrous ammonia by fractionation. 2,519,451 Lummus Co.

**Treating Steffen's filtrate** with sulfuric acid under non-hydrolyzing conditions separating inorganic sulfates, treating the resultant solution with hydrochloric acid and separating a solid composition comprising betaine hydrochloride. 2,519,573. International Minerals and Chemical Corp.

**Purifying the lithium halide residue** obtained from the manufacture of an aluminum containing hydride by reacting lithium hydride with an aluminum halide. 2,519,644. Metal Hydrides Inc.

## *Metals**

**Producing the silicide of a metal of the group consisting of Ta and Cb** from the pentoxide of a metal of said group by treating the pentoxide with a converting agent selected from the group consisting of lithium silicide, magnesium silicide, calcium silicide, barium silicide and aluminum silicide. 2,516,863. Daniel Gardner.

**Surface-treating stainless steels,** by roughening the surface of the steel, black oxide-coating the roughened surface in a bath of molten sodium dichromate, and grinding away the tops of the hills to expose the underlying metal. 2,516,986. Armco Steel Corp.

**Plating bath** for electrolycically depositing chromium—an aqueous solution containing chromic oxide, hydrofluoric acid and an organic acid selected from the class consisting of malic and tartaric acids. 2,517,441. Ductile Chrome Process Co.

**Pickling a ferrous metal** by the action of a heated nonoxidizing mineral acid containing a compound of the structure Ar—N=C—S(RO)nH. 2,518,109. Monsanto Chemical Co.

**In producing metallic uranium** by electrolyzing a uranium salt in a fused bath consisting of mixed alkali and alkaline earth halides, the improvement in which anhydrous uranium tetra fluoride is the uranium salt. 2,519,792. U.S.A. as represented by the U.S. Atomic Energy Commission.

**Electrolytic bath** for the electrodeposition of nickel cobalt alloys upon non-conductors consisting in aqueous solution of nickel sulphate, cobalt sulphate, boric acid, sodium

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fluoride, sodium chloride, sodium naphthalene trisulphonate and sulphonated aliphatic alcohol. 2,519,858. Peter Spiro and Fritz Wohlgemuth.

### *Organic**

**Recovering sterols** from oils, fats, fatty acids and fatty mixtures by treating with a low molecular weight monohydric alcohol of the group containing methyl and ethyl alcohol, separating the produced esters by distillation under a high vacuum, isolating the sterols by saponification, separating the sterols by extraction and purifying by crystallization and recrystallization. 2,516,834. Severoceske tukove zavody, narodni podnik.

**Producing butadiene** from a substance selected from the group of petroleum fractions by cracking by combining it with sulphur and bombarding with high speed electrons whereby the said substance present in said mixture is decomposed and butadiene is formed. 2,516,848. Electronized Chemicals Corp.

**Producing butadiene** from ethyl alcohol by dehydrating and dehydrogenating ethyl alcohol by bombarding with high speed electrons, forming a mixture comprising butadiene and aromatic compounds, and thereafter bombarding the aromatic compounds again with high speed electrons. 2,516,849. Electronized Chemicals Corp.

**Preparing ethyl alpha-amino beta, beta-diethoxy propionate hydrochloride** by subjecting the sodium enolate of ethyl alpha-formylamino beta-hydroxy acrylate to the action of a solution of hydrogen chloride in ethanol. 2,516,900. People of the U.S.A.

**Addition products of aliphatic acid esters of orthophosphoric acid and dialiphaticaminomethyl phenols.** 2,516,913. Tide Water Associated Oil Co.

**Producing aliphatic ketones** from carbon monoxide and hydrogen by passing carbon monoxide and hydrogen over a synthesis catalyst maintained in a fluidized state, effecting substantial conversion of carbon monoxide and hydrogen into a product mixture of oxygenated compounds comprising aliphatic primary alcohols and aliphatic acids, continuously discharging said product mixture, passing said product mixture to a dehydrogenation zone containing a chromic oxide catalyst in a fluidized state, effecting substantial conversion of said primary alcohols and acids into ketones, accompanied by the formation of gaseous products comprising hydrogen, carbon monoxide and carbon dioxide. 2,516,958. Texas Co.

**Chloroethylation of alkylated benzene compounds** by condensing di(alphachloroethyl) ether with a polymethyl-substituted benzene in the presence of zinc chloride. 2,516,-971. Distillers Co., Ltd.

**Production of unsaturated aliphatic aldehydes,** by reacting a mixture of formaldehyde and a higher saturated aliphatic aldehyde in the presence of a finely divided catalyst, regenerating the catalyst by reacting with oxygen. 2,517,-006. Celanese Corp. of America.

**Manufacture of acetaldol,** by mixing acetaldehyde with an alkali metal hydroxide in the absence of free oxygen. 2,517,013. Celanese Corp. of America.

**Monopyridinium derivatives of esterified oxyalkylated diphenylol methanes.** 2,517,091. Petrolite Corp., Ltd.

**Monopyridinium derivatives of esters of oxyalkylated diphenylol methanes.** 2,517,092. Petrolite Corp., Ltd.

**Pyridinium derivatives of phenoxyalkanol esters.** 2,517,093. Petrolite Corp., Ltd.

**Dipyridinium derivatives of esterified oxyalkylated diphenylol methanes.** 2,517,094. Petrolite Corp., Ltd.

**Dicarboxyphenyldimethylsilane.** 2,517,146. Dow Corning Corp.

**Preparation of 5-carbon saturated acyclic aldehydes** by heating a mixture of a cobalt hydrogenation catalyst, carbon monoxide, and hydrogen and injecting butadiene. 2,517,-383. E. I. du Pont de Nemours & Co.

**Hydroxy alkyl xanthines.** 2,517,410. G. D. Searle & Co.

**Preparation of esters** having two acetoxy groups on one carbon by reacting, in the presence of a cobalt hydrogenating catalyst, carbon monoxide and hydrogen with acetic anhydride and a non-aromatic hydrocarbon having one unsaturation and that olefinic and having hydrogen on unsaturated carbon. 2,517,416. E. I. du Pont de Nemours & Co.

**Production of an ether of phenyl methyl carbinol** by heating a mixture of styrene with an aralkyl alcohol having a saturated hydrocarbon group attached to the hydroxyl group, an acidic catalyst and phenyl acetylene. 2,517,418. Distillers Co., Ltd.

**Phenoxyacetamidines.** 2,517,468. Ciba Pharmaceutical Products, Inc.

**In preparing symmetrical monoaminodihydroxytoluene,** maintaining an aqueous solution of a hydrochloride of symmetrical triaminotoluene below boiling until only two of the amino groups of said symmetrical triaminotoluene are converted to hydrox groups, filtering, evaporating with a solvent in which the hydrochloride of the monoaminodihydroxytoluene is soluble and in which ammonium chloride is insoluble, evaporating in vacuo, admixing with an aqueous solution of an alkali, and recovering the resulting symmetrical monoaminodihydroxytoluene. 2,517,496. Edwal Labs., Inc.

**2-Formylethanes.** 2,517,526. American Cyanamid Co.

**Preparing 2-amino-4-hydroxy-6-formyl pteridine** by mixing a member of the group consisting of 2-amino-4-hydroxy-6-dibromomethyl pteridine and sales with an aqueous solution. 2,517,530. American Cyanamid Co.

**Stabilizing a liquid organo-siloxane** by adding a 2-alkyl-4-alkoxy phenol. 2,517,536. Universal Oil Products Co.

**Acetals of 2-oxy-tetrahydropyran and tetrahydrofuran-3-aldehydes.** 2,517,543. General Aniline & Film Corp.

**Preparation of levopimaric-6, 8a-transendosuccinic acid** by heating a material having the structural formula of the Diels-Alder adduct of levopimaric acid and maleic anhydride with alkaline material, heating being continued to effect complete isomerization of the maleic group to the fumaric group. 2,517,563. Hercules Powder Co.

**Preparing alpha-ionones,** by treating under anhydrous conditions the corresponding pseudo-ionones with boron trifluoride, until cyclization is complete. 2,517,576. Givaudan Corp.

**N-(2-cyanoethyl)-2-pyrrolidone-5-carboxylic acid.** 2,517,585. U.S.A. as represented by the Secretary of Agriculture.

**Enolic ester of an alkyl ester of formyl penaldic acid.** 2,517,-588. People of the U.S.A.

**Crystallizing glutamic acid.** 2,517,601. International Minerals & Chemical Corp.

**Alkoxy aminopyrimidines.** 2,517,650. Nepera Chemical Co.

**Making propyl isobutyl ketone** by heating isobutylene and n-butyraldehyde in the presence of dibenzoyl peroxide. 2,517,684. U. S. Rubber Co.

**Making isopentenyl propyl ketone** by heating n-butyraldehyde with isoprene in the presence of dibenzoyl peroxide. 2,517,685. U. S. Rubber Co.

**Liquid phase decarboxylation of rosin** in the presence of a catalyst for preparing a rosin oil. 2,517,690. Compagnie Francaise de Raffinage, Societe Anonyme.

**Purifying technical grade methyl anthranilate** by dispersing in water at a temperature above the melting point of the compound and an emulsifying agent, cooling below the melting point until the compound separates as a solid phase, and separating. 2,517,691. Dow Chemical Co.

**Preparing a piperidyl ketone** by reacting a compound selected from the group consisting of alkyl magnesium halides and alkyl-alkali metal compounds with a 1-lower-alkyl-4-phenyl-piperidine-(4)-carboxylic acid ester, decomposing the reaction product, and isolating the resultant 1-lower-alkyl-4-phenyl-piperidyl-(4)-ketone. 2,517,695. Ciba Pharmaceutical Products, Inc.

**Production of α-(saturated hydrocarbon substituted) caproic acids** by heating a 2-(saturated hydrocarbon substituted) cyclohexanol with a fused alkali metal hydroxide. 2,517,-708. Dow Chemical Co.

**Purifying the crude crystalline acid $C_{10}H_{16}O_2$** preparable by the caustic alkali fusion of hydroxytetrahydro-nor-dicyclopentadiene by dispersing the crude acid in water at a temperature above the melting point of the crude acid and containing an emulsifying agent, cooling to a temperature below the melting point of the acid until the acid separates as a solid phase, and separating. 2,517,709. Dow Chemical Co.

**Simultaneously producing methyl ethyl ketone, methyl n-butyl ketone** and methyl n-hexyl ketone by heating a non-aqueous reaction mixture comprising acetaldehyde and ethylene in the presence of dibenzoyl peroxide as a catalyst. 2,517,732. U. S. Rubber Co.

**Mixing a stream of air** with a non-corrosive liquid propylene glycol in which the amount of water present does not exceed 15% while the glycol is at a temperature above 100° C. to maintain the non-corrosive condition therein at least as long as such aeration continues. 2,517,734. Dow Chemical Co.

**Producing a substituted imidazolidone-2-compound** by heating in the liquid phase a urea of the group consisting of $CO(NH_2)_2$ and lower alkyl substituted ureas with a 1,2 alkylene polyamine. 2,517,750. Union Carbide and Carbon Corp.

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**2-(p-isothiocyanobenzenesulfonamido)-pyrimidine.** 2,517,760. Wm. S. Merrell Co.

**Dehydrating castor oil** by adding to the castor oil in increments during the dehydration a dehydrating sulfuric acid catalyst solution containing a diluent. 2,517,765. Sherwin-Williams Co.

**Preparing alpha-irone isomers** by cyclization of pseudo-irones. 2,517,800. Givaudan Corp.

**Beta-(2-benzothienyl)-alpha-amino propionic acid.** 2,517,826. National Drug Co.

**Separation of a cyclic mono-olefin** from a mixture of straight chain mono-olefin by continuously contacting with an aqueous solution of hydrogen fluoride. 2,517,839. Phillips Petroleum Co.

**Hydrolyzing diphenyl trichlorethane** to form the alkali salt of diphenyl acetic acid, by dissolving a unit charge of diphenyl trichlorethane in an excess of alkali dissolved in diethylene glycol. 2,517,856. Kay-Fries Chemicals, Inc.

**Preparing an aromatic acyl fluoride** by reacting under anhydrous conditions in an inert solvent an aromatic diazonium fluoborate with carbon monoxide. 2,517,898. E. I. du Pont de Nemours & Co.

**A 2-(1,3,3-trimethylbutyl)-5,7,7-trimethyl wholly acrylic 18-carbon-atom-compound** selected from the class consisting of 2-(1,3,3-trimethylbutyl)-3-hydroxy-5,7,7-trimethyloctanal,2-(1,3,3-trimethylbutyl)-5,7,7-trimethyl-2-octenal and 2-(1,3,3-trimethylbutyl)-5,7,7-trimethyl-1-octanol. 2,517,916. E. I. du Pont de Nemours & Co.

**Naphthyridine derivatives.** 2,517,929. Cilag Ltd.

**Halogenated aromatic compounds.** 2,517,930. Sprague Electric Co.

**Preparation of alkyl disulfides** by circulating a solution of a mercaptan dissolved in alkyl disulfide through a catlytic oxidation zone in the presence of dissolved oxygen-containing gas in contact with an oxidation catalyst to effect oxidation of the mercaptan to the corresponding disulfide. 2,517,934. Phillips Petroleum Co.

**Compound of the group** consisting of 1:4-diaminoanthraquinone and its sulphonation products, which carries in the 2- and 3-positions of the anthraquinone nucleus the negative substituent of a phenol selected from the group consisting of 4-hydroxydiphenyl, 4-hydroxydiphenyl ether and 2-hydroxydiphenylene oxide. 2,517,935. Imperial Chemical Industries Ltd.

**A diester** of a nitroaliphatic monohydric alcohol and peroxydicarbonic acid. 2,517,964. Pittsburgh Plate Glass Co.

**Preparing a carbonate ester** by reacting a haloformate with an alcohol whereby the carbonate ester containing haloformate halogen as an impurity is obtained, removing haloformate halogen from the carbonate ester by contacting with a compound selected from the group consisting of ammonia and ammonium compounds which will liberate ammonia for reaction with HCl. 2,517,965. Pittsburgh Plate Glass Co.

**Preparation of monochlorovinylcyclohexene** by introducing gaseous chlorine into a solution of 1-vinylcyclohexene-3 in an inert solvent. 2,518,017. Sun Oil Co.

**Preparing a carbonate ester** by reacting a 1,2 epoxide with an ester of an haloformic acid. 2,518,058. Pittsburgh Plate Glass Co.

**Production of methacrylonitrile** from isobutylene-nitrosyl chloride adduct, by heating an aromatic tertiary nitrogen organic base and phthalic acid, adding isobutylene-nitrosyl chloride adduct, distilling off methacrylonitrile, and recovering and reemploying phthalic acid and aromatic tertiary nitrogen organic base. 2,518,089. Allied Chemical & Dye.

**Making stable halogenated hydrocarbon oils** by polymerizing difluorovinyl chloride and chlorinating the resulting product with elemental chlorine in the presence of light. 2,518,122. Allied Chemical & Dye Corp.

**Producing an N-oxide of a tertiary organic base,** by reacting said base in the presence of a lower fatty acid which is resistant to oxidation with hydrogen peroxide. 2,518,130. Ralph L. Evans.

**N-alpha-auro-mercapto-acetyl-aminophenols.** 2,518,154. Mozes Juda Lewenstein.

**Preparing amides** by reacting an organic nitrile free of reacting substituent groups with an ether selected from the group consisting of secondary and tertiary ethers of secondary and tertiary alcohols free of other reacting groups, in the presence of a strong acid catalyst and water. 2,518,156. E. I. du Pont de Nemours & Co.

**Dicarboxylic acid derivatives of 2-sulfanilamido-1,3,4-thiadiazole.** 2,518,227. Allied Labs., Inc.

**Amides of dicarboxylic acid derivatives of 2-sulfanilamidothiazole.** 2,518,228. Allied Labs., Inc.

**Synergistic antioxidant** containing amino acids. 2,518,233. Lloyd A. Hall.

**Simultaneous hydrolysis and hydrogenation of starch** to sorbitol in an aqueous medium by subjecting a mixture consisting of starch, water and magnesium chloride to the action of hydrogen in the presence of a nickel-kieselguhr catalyst. 2,518,235. Shell Development Co.

**Separating two aromatic hydrocarbons** having the same number of double bonds per molecule and the same number of aromatic rings per molecule by passing through a body of activated carbon, thereby selectively adsorbing one of said aromatic hydrocarbons. 2,518,236. Sun Oil Co.

**Diphenyl-4,4'-di(sulfonyl azide).** 2,518,249. Monsanto Chemical Co.

**Preparing 1-substituted imidazolidones-2** where said 1-substituent is a radical selected from the group consisting of aliphatic, cycloaliphic, araliphatic, aryl and alpharyl, by heating a 2-imino-3-substituted oxazolidine, where said 3-substituent is selected from the aforesaid group, under anhydrous conditions and recovering the resultant imidazolidone. 2,518,264. American Cyanamid Co.

**Recovery of maleic or phthalic anhydride** from a wet process gas mixture by adsorbing said anhydride on an adsorbent from the group consisting of activated carbon and silica gel, and removing the anhydride from said adsorbent. 2,518,312. E. I. du Pont de Nemours & Co.

**Ether** of a polyhydric alcohol of from 2 to 6 carbon atoms in which one hydroxyl hydrogen atom of said alcohol is replaced by the vinyl group and in which the remaining hydroxy hydrogen atoms are replaced by 2-alkenyl groups. 2,518,321. E. I. du Pont de Nemours & Co.

**Metal-containing organic compound** obtained by reacting elemental sulfur with a basic polyvalent metal salt of an alkylated phenol sulfide. 2,518,379. Standard Oil Development Co.

**Preparation of aliphatic nitriles** by contacting a paraffinic hydrocarbon having at least one tertiary carbon atom with an unsaturated aliphatic nitrile. 2,518,397. Socony-Vacuum Oil Co., Inc.

**Preparation of acroleins** by passing a mixture of an aldehyde, $RCH_2CHO$, and formaldehyde into the molten salt of a strong acid and of a saturated non-tertiary amine. 2,518,416. Rohm & Haas Co.

**Manufacture of isobutylene** by depolymerizing a liquid polymer comprising essentially isobutylene dimer by passing said polymer over a catalyst over a synthetic surface active silica-alumina. 23,254. Gulf Research & Development Co.

**Tristerin-11:11':11"-triols tris-methylolcarbomate.** 2,518,444. Imperial Chemical Industries Ltd.

**Preparation of acyloxy carboxylic acids** from esters of hydroxy carboxylic acids. 2,518,456. U.S.A. as represented by the Secretary of Agriculture.

**1-dicarbalkoxymethylene-2-alkyl-1,2-dihydroisoquinolines.** 2,518,512. Eastman Kodak Co.

**Levulinic acid salts of amino benzoates.** 2,518,525. David Curtis.

**Producing an aliphatic amine** containing an alkapolyenyl group of at least 8 carbon atoms by reacting an aliphatic amine and a conjugated alkadiene in the presence of an alkali metal catalyst. 2,518,528. Universal Oil Products Co.

**Preparing 1,4-dicyano-2-butene** by reaction of hydrogen cyanide with a dihalo addition product of 1,3-butadiene. 2,518,608. E. I. du Pont de Nemours & Co.

**Purifying a crude alkanesulfonic acid** containing sulfuric acid as an impurity, by contacting said crude alkanesulfonic acid with hydrogen sulfide to reduce sulfuric acid to produce sulfur. 2,518,639. Standard Oil Co., Indiana.

**Preparing n-butylamine** by hydrogenating in the presence of a metal hydrogenation catalyst, a mixture consisting of n-butyraldehyde, n-butyraldimine and ammonia. 2,518,659. Eastman Kodak Co.

**Making beta-propionolactone by reacting ketene with formaldehyde** in the presence of cadmium difluorophosphate. 2,518,662. Eastman Kodak Co.

**Tetrahydroxy etiocholanic acid and esters thereof.** 2,518,672. Trustees of the University of Pennsylvania.

**In the separation of straight chain hydrocarbons** from their fluid mixture with non-straight chain hydrocarbons, the improvement which comprises adding the urea solution of a water-soluble wetting agent and a neutral water-soluble electrolyte. 2,518,677. Shell Development Co.

**Ester of citric acid** selected from the class consisting of monoisopropyl citrate and monostearyl citrate. 2,518,678. Best Foods, Inc.

**In a two stage process for producing acetylene** in which the first stage comprises heating fluid hydrocarbons at subatmospheric pressure to vaporize any liquid portions thereof and to produce unsaturated hydrocarbon compounds convertible into acetylene and the second stage comprises

heating the resultant gas to a higher temperature to convert the unsaturated hydrocarbon compounds into acetylene, the step intermediate the two stages, which consists in injecting into the gas an inert diluent gas whereby to maintain subatmospheric pressure on the gas in the first stage and raise the total pressure of the mixture to atmospheric in the second stage. 2,518,688. Tennessee Eastman Corp.

**Making aromatic esters of phosphoric acid** by heating $P_2O_5$ with a symmetrical aromatic ether to form a neutral aromatic orthophosphate ester $(RO)_3PO$, wherein R represents an aromatic hydrocarbon radical. 2,518,692. Eastman Kodak Co.

**o- and m-hydroxybenzamidobenzaldehydes** and their acetals with lower alkanols and alkanediols. 2,518,704. E. I. du Pont de Nemours & Co.

**Synthesis of aliphatic amines** by contacting a gaseous mixture containing ammonia and hydrogen and carbon monoxide with a hydrogenation catalyst containing no metallic catalyst other than iron. 2,518,754. Phillips Petroleum Co.

**Glyceride oil composition of improved cold test,** comprising a glyceride oil having incorporated therein a small amount of an improving agent having a hydroxyaromatic compound containing not more than 3 benzene rings with relatively high molecular weight aliphatic hydrocarbons as substituets therein, the said improving agent having at least three hydrogen atoms of the hydroxyaromatic compound replaced with alkyl radicals of the aliphatic hydrocarbons. 2,518,917. Swift & Co.

**Formation of a 4-keto-1,3-benzodioxane.** 2,518,922. Monsanto Chemical Co.

**Production of glycol diesters** by heating an aromatic aldehyde, in which the aldehyde group is attached to an aromatic ring, in contact with a source of free radicals from the group consisting of actinic light and organic peroxides. 2,518,940. Shell Development Co.

**Preparation of 3'-bromo-4'-methyl-2-benzoylbenzoic acid** by bromination of p-toluylbenzoic acid with bromine in sulfuric acid with bromine in the presence of sulfuryl chloride. 2,519,037. E. I. du Pont de Nemours & Co.

**Heating and reacting ε-benzoylamino caproic acid** with sulfuryl chloride until the α-chloro acid is formed. 2,519,038. Alexander Galat.

**Preparing nitro-2-(2'-thenoyl)-benzoic acid alkyl esters** by reacting a 2-carboalkoxy-nitrobenzoyl chloride with a thiophene compound in an inert organic solvent in the presence of anhydrous stannic chloride and phosphorus oxychloride. 2.519,040. E. I. du Pont de Nemours & Co.

**In the catalytic hydration of an aliphatic ether** to the corresponding aliphatic alcohol over a solid hydration catalyst containing a difficultly reducible hydrous oxide whereby a portion of the ether decomposes to olefin hydrocarbon and water, the improvement which consists in carrying out the hydration reaction under superatmospheric pressures and meanwhile introducing additional olefin. 2,519,061. Standard Oil Development Co.

**Producing an alkyl-aromatic hydrocarbon compound** by contacting a polymerizable aliphatic olefin hydrocarbon and a mononuclear alkylatable aromatic hydrocarbon in the presence of a catalyst comprising nickel-oxide and silica-alumina. 2,519,099. Phillips Petroleum Co.

**Cholesteryl diethylaminoacetate salt of benzyl penicillinate.** 2,519,112. Abbott Labs.

**In the treatment of a chloroethyl dichlorobenzene** to produce the corresponding dichlorostyrene, contacting the chloroethyl dichlorobenzene with a catalytic amount of asbestos having in admixture therewith an alkaline earth metal halide and of oxides of zinc, chromium and cobalt. 2,519,125. Mathieson Chemical Corp.

**Synthesis of a vinyl fluoride** by subjecting an acetylenic hydrocarbon compound, in admixture with hydrogen fluoride, to contact in the vapor phase with a catalyst composition comprising mercury oxide which is at least partially combined chemically with an oxide of nitrogen supported on a carrier. 2,519,199. E. I. du Pont de Nemours & Co.

**Separation and recovery of carbon monoxide** from a gaseous mixture by contacting the mixture with a solution of a cuprous salt in ortho anisidine and thereby effecting preferential solution of the carbon monoxide and desorbing the resulting solution. 2,519,284. Phillips Petroleum Co.

**Preparing oxygenated naphthenes,** by oxidizing a naphthenic hydrocarbon fraction in the vapor phase with oxygen, in the absence of a catalyst. 2,519,309. Socony-Vacuum Oil Co., Inc.

**Alkaline and alkaline earth salts** of inorganic esters of n-heterocyclic-1-phenol-4-sulfonamides. 2,519,314. American Cyanamid Co.

**Preparing chloranil** by heating pentachlorobenzotrifluoride with $SbF_5$ in a solvent medium composed of perfluoro-1,3-dimethyl-cyclohexane. 2,519,319. U.S.A. as represented by the U.S. Atomic Energy Commission.

**Condensing, in the presence of an alkali,** beta-(4-methyl-$\Delta^3$-cyclohexenyl)-butyraldehyde and a member selected from the class consisting of aldehydes and methyl ketones. 2,519,327. Food Machinery and Chemical Corp.

**Azeotropic distillation of toluene.** 23,262. Union Oil Co. of Calif.

**Separating paraxylene from meta xylene,** by sulfonating meta xylene in a feed mixture of said xylenes to enable para xylene to be separated therefrom by crystallization. 2,519,336. Standard Oil Development Co.

**2-tertiary-butylperoxy-2-methylpropanesulfonyl chloride.** 2,519,403. Shell Development Co.

**α-phenyl-α-(4-quinolyl) acetonitriles.** 2,519,411. Sterling Drug Inc.

**Separating an individual organic nitrogen base** from a mixture of two of the pyridine bases consisting of the group 3-picoline, 4-picoline and 2,6-lutidine by dehydration. 2,519,412. Koppers Co., Inc.

**Reacting a compound** selected from the group which consists of chloral and chloral hydrate with chlorobenzene, in oleum to produce a mixture comprising non-aqueous sulfuric acid and a chlorobenzene solution containing di-(chlorophenyl)-trichloroethane; and separating the chlorobenzene layer from the sulfuric acid. 2,519,423. Merck & Co., Inc.

**Xylylene bis(quaternary ammonium halides).** 2,519,440. Rohm & Haas Co.

**Tris-quaternary salts of 1,3,5-tris-dimethylaminomethyl benzene and alkyl benzyl chlorides.** 2,519,441. Rohm & Haas Co.

**Theophylline-monoaminobenzoic acid-alkali metal hydroxide reaction product.** 2,519,450. Chattanooga Medicine Co.

**Preparing α,γ-diacyloxy-β,β-dimethyl-butyric acid** by reacting α,γ-dihydroxy-β,β-dimethyl-butyramide with a compound selected from the class which consists of lower aliphatic carboxylic acid anhydrides and lower aliphatic carboxylic acid chlorides, and reacting the compound thus obtained with amyl nitrite. 2,519,462. Merck & Co., Inc.

**In maintaining the fresh appearance of fruits and vegetables** during shipment, the step of subjecting fresh fruits and vegetables to the action of an aqueous medium containing 3-hydroxybutanal. 2,519,465. Zenith Processing Corp.

**Reacting 2-methyl-3-hydroxy-4-oximinomethyl-5-hydroxymethylpyridine** with nitrous acid treating the reaction product with a lower aliphatic alcohol, recovering the 1,3-dihydro-1-alkoxy-6-methyl-furo-(3,4-c)-pyridine-7-ol thus formed, hydrolyzing and recovering an equilibrium mixture of 1,3-dihydro-1-hydroxy-6-methyl-furo-(3,4-c)-pyridine-7-ol and 2-methyl-3-hydroxy-4-formyl-5-hydroxymethylpyridine. 2,519,469. Merck & Co., Inc.

**Reacting 2-methyl-3-hydroxy-4-aminomethyl-5-hydroxymethylpyridine hydrochloride** with phosphorus oxychloride in aqueous medium, neutralizing with calcium carbonate, adding alcohol, precipitating the calcium salt of 2-methyl-3-hydroxy-4-aminomethyl-5-phosphonoxymethylpyridine, recovering the precipitate, reacting a sodium hydroxide suspension of said precipitate with an ether solution of p-toluenesulfonyl chloride and recovering 2-methyl-3-p-toluenesulfonoxy-4-p-toluenesulfonylaminomethyl-5-phosphonoxy-methylpyridine. 2,519,470. Merck & Co., Inc.

**Quinolyl sulfonamido compounds.** 2,519,484. Meyer Levitz, Ruth C. Auchincloss and Reginald Auchincloss.

**20,21-diacetoxy-4-bromo-3,11-diketo-pregnanes.** 2,519,507. Merck & Co., Inc.

**Biotin aliphatic amides.** 2,519,530. Merck & Co., Inc.

**Manufacturing diethylacetal** by reacting acetaldehyde with ethanol in the presence of an acidic catalyst and of an inert organic solvent for acetal which is immiscible with water. 2,519,540. Distillers Co., Ltd.

**Making 1,2-propanediamine** wherein 1-aminopropanol-2 in the liquid phase is heated with ammonia in the presence of a hydrogenation catalyst. 2,519,560. Union Carbide and Carbon Corp.

**Producing an indan hydrocarbon** by reacting at a hydrogen transfer temperature of from about —30° to about 100° C. in the presence of an acid-acting catalyst, a tertiary alkylated phenol and an alkylated aromatic hydrocarbon. 2,519,576. Universal Oil Products Co.

**Catalytic hydrogenation** of alkenyl furans, in the presence of an ammonia-type compound selected from the group consisting of ammonia and amines, whereby the side chain is hydrogenated to the saturation while hydrogenation of the furan nucleus is suppressed. 2,519,631. Imperial Chemical Industries Ltd.

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Show your product at its best and give it top protection at the same time. Pack it in one of Continental's "F" Style cans. These handsomely fully lithographed cans, which add sales appeal to any product, come in the following standard sizes: ½-pint, pint, quart, ½-gallon and gallon. All are equipped with pouring nozzles, and larger sizes are furnished with handles. For further information on these good-looking practical containers, check with Continental.
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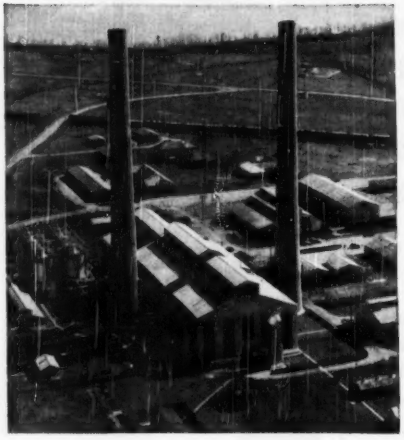
# SULPHUR

*Interesting Facts Concerning This Basic Raw Material from the Gulf Coast Region

## *MINING



The process of mining sulphur, as developed by Herman Frasch, takes advantage of the fairly low melting point of sulphur (about 240° Fahrenheit). The process resolves itself into three parts: one, operating a power plant that heats and pumps to the field large quantities of water; two, distributing the hot water through wells to melt the underground sulphur, and raising the melted sulphur to the surface; three, cooling and solidifying the sulphur in large vats from which it is broken and loaded into cars for shipment.

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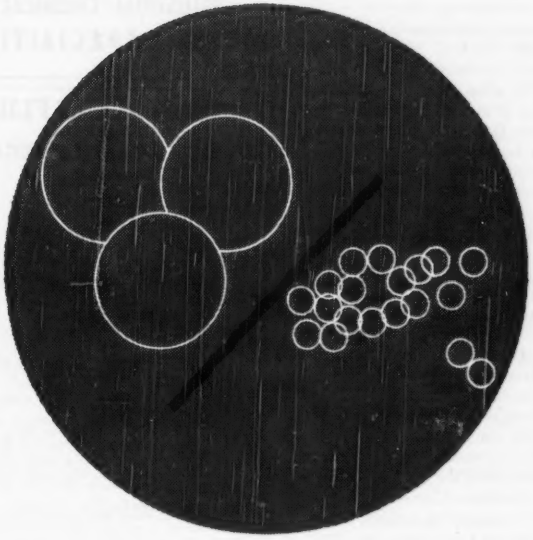

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## Dow's Complaint System

(Continued from page 731)

as he receives a complaint, either through the salesman's report or a customer's letter, and follows it up to insure prompt action. Since a large proportion of complaints result in credits, the Coordinator is logically located in the Credit and Debit Memorandum Section of the Sales Department.

### SEVERAL COPIES

He initiates inquiry into a complaint by preparing an 8-copy form describing it. Five go to Product Quality Control, one to the sales group handling the product involved, and one to the division manager. He retains the final copy for his follow-up file.

Of the five copies received by Product Quality Control, two go to the plant which produced the material involved. The plant reports its findings, in the space provided, returns one copy to Product Quality Control and retains the other copy for its records.

Upon receiving the plant's information, Product Quality Control transfers it to the three undistributed copies, adding its own findings in the space provided. It also includes its recommendations as to the disposition of the complaint. Two copies of the completed report are distributed to the Complaint Coordinator and division manager, respectively, and the third copy is retained in Product Quality Control's records.

The Coordinator then delivers the complete file on the complaint to the sales group responsible for the product. This group makes the final adjustment with the customer. Copies of all correspondence relating to a complaint are prepared by the sales group for Product Quality Control and the division manager.

### EVERYONE APPRISED

Octuplicate forms conjure up a vision of snarled red tape. On the contrary, each of the steps in the procedure, and each of the various forms, is essential to inform the various involved groups—sales, product control, production and management—of the problem at hand. Since all of them can work simultaneously on the complaint and all can contribute their special knowledge, the customer is served faster and better.

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Of Chemical Industries published Monthly at Philadelphia, Pennsylvania for October 1, 1950.

1. The name and address of the publisher, editor, managing editor and business manager is: Publisher, McGraw-Hill Publishing Company, Inc., 330 West 42nd Street, New York, N. Y.; Editor, W. A. Jordan, 330 West 42nd Street, New York, N. Y.; Managing editor, H. C. E. Johnson, 330 West 42nd Street, New York, N. Y; Business manager A. E. Wels, 330 West 42nd Street, New York, N. Y.

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McGRAW-HILL PUBLISHING COMPANY, INC.
By J. A. GERARDI, Vice Pres. & Treas.

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(SEAL)
ELVA C. MASLIN
(My commission expires March 30, 1952)

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To implement expanded editorial programs on Chemical Industries and Chemical Engineering, McGraw-Hill plans the following staff additions:

**ENGINEERING EDITOR.**
Requirements: Graduate chemical or mechanical engineer with at least five years' production experience in chemical process industries.

**MARKET EDITOR.**
Requirements: Chemical or chemical engineering background with at least three years' experience in sales, purchasing or market research.

**NEWS EDITOR.**
Requirements: Chemical or chemical engineering background, familiar with chemical or chemical process industries.

**REGIONAL EDITOR.**
Requirements: Chemical or chemical engineering background, familiar with chemical or chemical process industries.

**LOCATION: New York, except for regional editor, who will be headquartered in Chicago. Please submit complete biographical data and indicate salary expected. By mail only to:**

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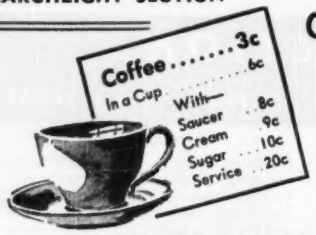


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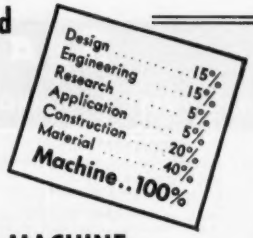


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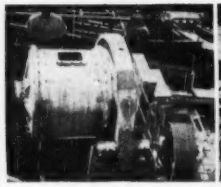

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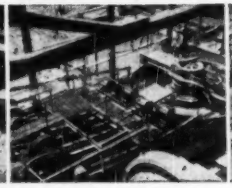

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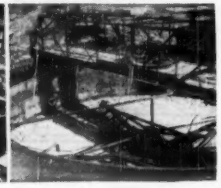

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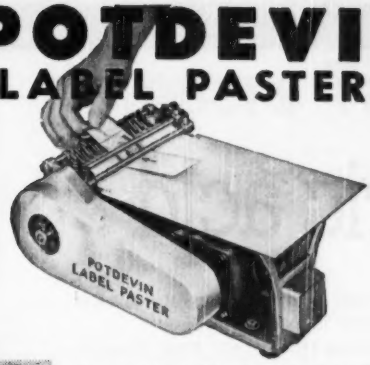

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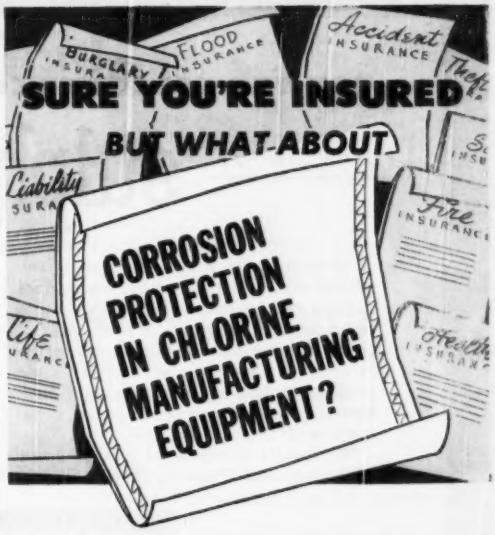


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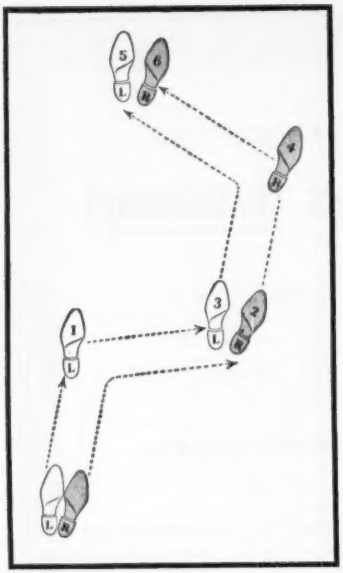


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| 680b | 687a | 692-693d | 694-695a | 703g | 745k | 753e | 767b | 771o | 782 | B786b | 801 | 810c | B833d | BL836 | BL839a |
| 680c | 687b | 692-693e | 694-695b | 704 | 746a | 754 | 767c | 771p | 783a | TL786a | 802a | 810d | L834a | BR836a | BL839b |
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| 680e | 687d | 692-693g | 696-697a | 706 | 746c | 755b | 768b | 771r | 783c | 787 | 803 | T812 | L834c | BR836c | BL839d |
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## Editorial Items

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| 744C | 756A | 770A[1] | 770F | 776A | 778C | 793E | 793M | 793U | 793CC | 793KK | 793SS | 794D | 794L | 794U | 794DD |
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